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Journal of Paediatric Surgeons of Bangladesh

Editorial

"World Health Dayand Pediatric Surgery Day 2026: May the Future Generation Be Protected by the Power of Science"

Look, this is an extraordinary occasion. It is a surprising and incredible fortune that today is Tuesday, April 7—a day of unprecedented connectivity. In 2026, both World Health Day and World Pediatric Surgery Day are observed on the same day! This is a potent message rather than only a coincidence. We are concentrating on World Pediatric Surgery Day today within the larger framework of World Health Day. It is difficult to achieve universal health coverage without providing children with safe and reasonably priced surgical services.

We must recognize that surgery is not a luxury; it is a child's right to live. If we cannot assure that children receive affordable and safe surgery, the objective of long-term health will remain elusive. So, with the power of science and our efforts, let us create a healthy future for our children.This pair reminds the worldwide medical community of an unavoidable truth: 'Universal Health Protection' or 'Health for All' is never achievable without providing safe, timely, and cheap pediatric surgical procedures to children. Let this day serve as a commitment to provide every youngster with the advantages of contemporary science.

I would like to include some significant scientific reasons in addition to human emotions:

1) Prospects for the future: We must keep in mind that pediatric surgery is the best investment in public health, not a convenience. Because a child's surgery ensures a healthy life for the following eighty to ninety years, unlike an adult's. You or the legislators are aware that this is a long-term "lifetime investment" rather than merely an operation when I mention 80–90 years.

2) Economic Impact and Importance: By eliminating handicap, pediatric surgery not only saves lives but also boosts the nation's productive workforce. This is known as "saving Daly" (Disability-Adjusted Life Years) in the context of public health, and it also benefits the nation's economy.

3) Scientific excellence: Thanks to current microsurgery and AI-assisted robotic or minimally invasive surgery, sophisticated surgeries may now be performed successfully on babies, which is a true miracle of science.

4) The issue of rights: We should aim to make surgery a basic right for all children rather than aextravagance.

By celebrating these two days simultaneously, the global medical community has brought to the fore a strictreality—it is impossible to achieve 'universal health protection' without ensuring safe, timely and affordable surgery for children. In the context of this day, one thing has become very clear today—surgery is not an isolated part of public health.Our priorities need to be rearranged. The fundamental goal behind the current global movement is to provide every child with access to safe and reasonably priced surgical services. According to medical science, pediatric surgery is one of the best long-term social expenditures in public health, not merely a medical operation.

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Experts agree that enhancing mother and child health through surgery is essential to achieving the SDG targets. Thus, today's topic is "Together for health." Stand with science: Our goal should be to create a society in which no child is denied surgery because of financial constraints or geographic distance. A generation is almost saved when a youngster undergoes effective surgery.So, let's work together and have faith in science to protect children's rights. The planet won't be fully healthy in the future unless we can use science to give every child this better service.

Let today's theme be - May every child be healthy through the hands of science.

Thank you.

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Original Article

Location of Anal Dimple and Its Positional Alignmentwith the Caudal Termination of the Striated Muscle Complex in Patients with Anorectal Malformations

Wafa F[1], Farooq M A A[2], Chowdhury T A[3], Chowdhury T K[4]*

Abstract

Background: In children with anorectal malformations (ARM), the midline perineal skin feature known as the anal dimple (AD) is commonly used as a surface landmark to guide surgical placement of the neoanus. The striated muscle complex (SMC), vital for continence, is presumed to align with this dimple and misalignment may lead to poor functional outcome such as incontinence.This study was conducted to find out whether the locationof the SMC correlate with AD in patients with ARM.

Methods: This cross-sectional study included 30 ARM patients undergoing various anorectal procedures. Intraoperatively, the boundaries of the AD and SMC were marked, and distances between centers (C-C) and lengths of AD (A-B) and SMC (A-B) were recorded using Vernier calipers.

Results: Mean agewas 16 months and male to female ratio 2:1. Recto-bulbar urethral fistula was predominant in male and vestibular fistula in female. In majority(80%) of the cases, SMC was posterior to AD.Male had more posterior locationwhereas female had more anterior locationof SMC in relation to AD. Distance between the center of AD and center of SMC (C-C) was found higher in the recto-bulbar urethral fistula followed by the recto-vesical fistula in comparison with perineal and vestibular fistula (F= 8.22, p= 0.00). Mean (C-C) displacement was 3.4 mm. Length of AD, SMC and C-C weakly correlated with each other.

Conclusion: The anatomical location of the SMC does not consistently match the AD. Reliance on the AD alone may risk misplacement ofthe neoanus, suggesting that intraoperative SMC visualization is crucial.

Key words: Anorectal malformation, striated muscle complex, anal dimple, anoplasty

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What is Already Known on This Topic

⇒ In patients with anorectal malformations neoanus should be placed within muscle complex to achieve a good continence mechanism.

⇒ Pediatric surgeons use muscle stimulator to locate the region of maximum muscle contraction to decide upon the site of neoanus and usually places marking along the anal dimple.

What This Study Adds

⇒ This study shows the variability in anatomical alignment between AD and SMC.

⇒ It also observes gender-related trends: posterior SMC in males, anterior in females.

How This Study Might Affect Research, Practice or Policy

⇒ This study puts emphasis on visual localization of muscle complex as this may poorly correlate with anal

dimple. Direct visual localisation is not always performed during laparoscopy assisted anoplasty procedures where a small perineal incision is given along the proposed anus based on location of anal dimple and muscle stimulation. As muscle stimulators are not available in many resource-limited centres, findings of this study will put valuable insight into planning placement of neoanus in ARM patients.

Introduction

Goal of surgical reconstruction for anorectal malformations (ARM) is to achieve good bowel and urinary function, as well as the ability of children to lead a healthy life.[1] Accurate placement of the neoanus in ARM repair is essential for achieving continence. The AD has traditionally served as a surface guide for SMC location during laparoscopic and perineal approaches. During laparoscopy-assisted anorectoplasty (LAARP) and trans-perineal approaches, a short 1-2 cm incision is made over the AD at the point of maximal contraction and caudo-cephalad elevation of the perineum by electrical stimulation.[2] This conventional technique for creating the tunnel between the perineal skin and the pelvic floor has been criticized as being semi-blind and may have a significant error in interpretation of the location of SMC.[3] There is also evidence that the sphincteric musculature is displaced, as well as, affected by presence of associated anomalies in patients with ARM.[3,4] Thereis paucity of information regarding the relation between the location of AD and the caudal termination of the SMC. It is also not known how often AD-based guidance results in mispositioning and adverse outcome. It is importantto know the relationship between themto optimize the placement of the rectum through the center of the SMC, determine the expansion of incision, and reduce tissue dissection, during repair in both open and laparoscopic procedures; and thus reduce the chance of fecal incontinence.The placement of neonauns in the correct position is extremely important as long term continence studies have shown thatboth constipation and fecal incontinence are common in treated ARM patients and they have significantly worse quality of life.[5,6] This study investigates whether the AD is a reliable indicator of underlying SMC anatomy in ARM cases.

Materials and methods

Study settings

This cross-sectional study was conducted at the Department of Pediatric Surgery, Chittagong Medical College Hospital, Chattogram between January 2023 and January 2024. Patients of ARM whounderwent posterior sagittal anorectoplasty (PSARP), anterior sagittal anorectoplasty (ASARP), anterior sagittal anoplasty (ASAP) and abdominoperineal pull through were included. Patients with distorted perineum (having meningocele, myelomeningocele, sacrococcygeal teratoma) that may make delinea tion of the anatomy difficult, cloacal malformations, patients with absence of anal dimple and with previous perineal surgery were excluded. Outcome variables were length of AD (A-B distance), length of SMC (A-B distance), distance between the center of AD and center of SMC (C-C distance) and location of SMC in relation to AD that were marked intraoperatively by vernier callipers (Figure 1).

Pre-operative assessment of the perineum andanal dimple was done. After giving general anesthesia, perineum was inspected and reconfirmation of the diagnosis with planning of surgical procedure was done. During PSARP, ASARP, ASAP andabdominoperineal pull through, the anterior and posterior limits and midpoints of AD and SMC were marked. Measurements were taken using validated Vernier callipers. All the measurements were performed by a single investigator (principal author) after receiving training from three senior pediatric surgeons to avoid interobserver variability. However, binding was not possible.

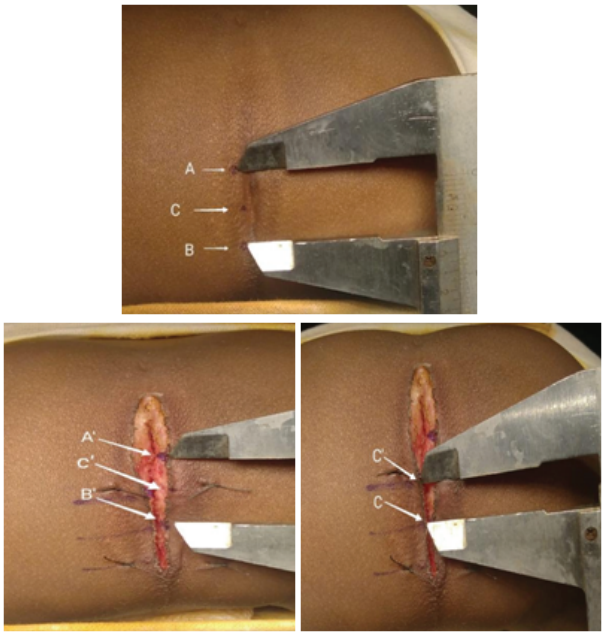


Figure 1: length of AD (A-B distance), length of SMC (A-B distance), distance between the center of AD and center of SMC (C-C distance)in a patient undergoing posterior sagittal anorectoplasty. A and A were posterior limits and B and B were anterior limits of AD and SMC respectively.

Operative technique:

After doing all pre-operative investigations, surgical procedures were done. Anterior sagittal anorectoplasty (ASARP), anterior sagittal anoplasty (ASAP) and abdominoperineal pull through were carried out in the supine position. Posterior sagittal anorectoplasty (PSARP) was carried out in the prone jack-knife

position. Appearance of the perineumwas categorized as well or flat.AD was categorized as either "well developed" or "moderately developed" according to subjective evaluation. Indelible ink was used to define the anterior limit of AD (point A) and posterior limit (point B). The midpoint of this distance was designated as the center of AD (point C). During the surgical process, the anterior limit of SMC (point A'), posterior limit of SMC (point B) and midpoint of SMC (point C') were marked. These marks were made by assessment of the limits where vertical fibers of SMC merged with the parasagittal fibers. Based on its overall development andfiber density, SMC was categorized as either “well developed” or “moderately developed”. Using Vernier calipers, the distance (C-C') between the center points of AD and SMC was measured. Location of SMC in relation to AD was determined.

Data Analysis

Descriptive analysis such as demographic information, clinical presentation was shown asfrequency and percentage. For presentation of quantitative and qualitative data, mean ± SD and frequency and percentage was used accordingly. Gender variation of superimposition of SMC and anal dimple was analysed by Chi-square test, differences in the lengths of AD, SMC and C-C across different groups defined by the location of the striated muscle complex (SMC)were analysed using ANOVA, and correlation among lengths of AD, SMC and C-C between each other were analysed using Pearson’s correlation test.Gender difference in length of AD, SMC and (C-C') were analysed using Student t test. Statistical significance was set at $p<0.05$. The Ethical Review Committee (ERC) of Chittagong Medical College and Hospital granted formal ethical clearance (Reference number of ERC is 59.27.0000.013.19. PG.009. 2023/967).

Results

Among the 30 patients, 4 (13.3%) were neonates, 17 (56.7%) were infants and 9 (30%) were children.More than two-third of the patients were less than 12 months of age.The mean age was 16.71 (± 27.75) months. 18/30 patients (60%) presented with well perineal appearance and 12(40%) had flat perineum. 18 (60%) patients hadprevious fecal diversion (colostomy) and underwent staged procedure.[12] (40%) had no colostomy and underwent primary surgical procedure.

Mean length of AD (A-B) was 12.57 (± 3.58) mm ranging from 5mm to 22mm. Mean length of SMC (A-B) was 11.15 (± 3.33) mm ranging from 5mm to 18mm. Mean displacement of the center of AD with the center of SMC (C-C) was 3.4 (± 3.24) mm. Figure 2 shows differences in median values.

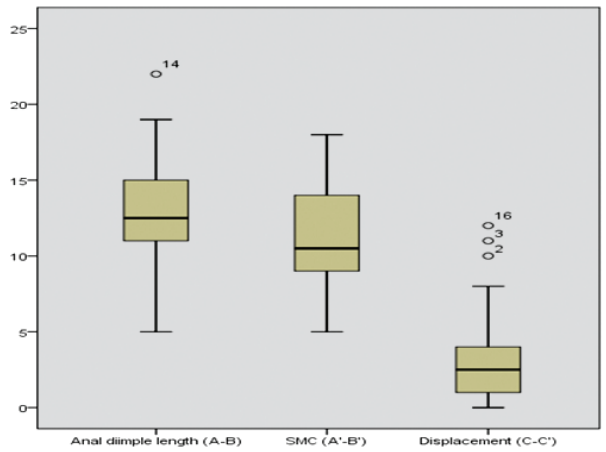


Figure 2: Box and Whisker plot diagram showing length of anal Dimple (AD), striated muscle complex (SMC) and displacement of the center of AD with the center of SMC (C-C). Boxes representinterquartile range, middle transvers line within boxes represent median values, whiskers represent lowest and highest values and outside circles represents outliers.

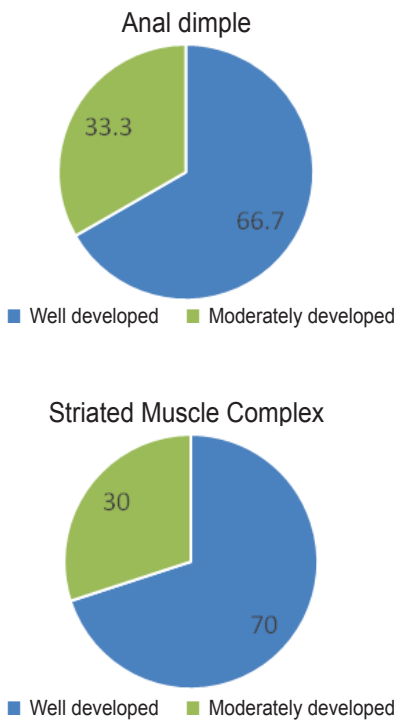


Figure 3: Development of Anal Dimple (AD) and striated muscle complex (SMC) in ARM patients (values represent percentage among total patients)

Among 30 patients, 20 (66.7%) patients had well-developed AD and 10 (33.3%) had moderately developed AD (Figure 3). In gender-wise analysis, among 20male, 12 (60%) had well-developed AD and 8 (40%) had moder

ately developed AD. Among 10female, 8 (80%) had well-developed AD and 2 (20%) moderately developed AD. Among 30 patients, 21 (70%) patients had well-developed SMC and 9 (30%) had moderately developed SMC. In gender-wise analysis, among 20 male, 13 (65%) had well developed SMC and 7 (35%) had moderately developed SMC. Among 10 female, 8 (80%) had well-developed SMC and 2 (20%) had moderately developedSMC. Location of SMC in relation to AD was categorized into superimposed and not superimposed (anterior and posterior). In 24 (80%) patients, center of SMC was posterior to AD. Among the rest, in 3 (10%) patients SMC was anterior to AD, in 3 (10%) patients center of SMC was superimposed with center of AD. (Table 1)

Table 1: Relationship of gender of the patient with location of striated muscle complex (SMC) in relation to anal dimple (AD) (n=30)

Location		Male (n=20)	Female (n=10)	Total	p value*
Not Superimposed	Posterior	17 (85)	7 (70)	24	p=0.34
	Anterior	1 (5)	2 (20)	3	
Superimposed		2 (10)	1 (10)	3	

* P value obtained from Chi-square test.

The mean length of anal dimple (AD) was higher in patients whose SMC was posterior in relation to AD. The mean length of striated muscle complex (SMC) was higher in anteriorly located SMC in relation to AD. The mean length of C-C was found higherin patients whose SMC was posterior in relation to AD. To find out the differences in variance, one-way ANOVA was performedand statistical significance was not found in either length of AD or length of SMC. But statistical significance was found in length of C-C in posterior location (Table 2).

Table 2: Relationship of length of AD, length of SMC and length of C-C with location of SMC in relation to AD

Length Mean ± SD (mm)	Location		Significance*
	Anterior	Posterior	
Length of AD	10.3±1.52	13.12±3.61	F=1.15, p=0.24
Length of SMC	14.0±3.6	11.35±2.95	F=4.9, p=0.24
Length of (C-C)	3.33±3.21	3.83±3.26	F=7.72, p=0.002

* P value obtained from One way analysis of variance (ANOVA) test.

The length of AD and the length of SMC correlatedwith each other and found statistically significant (p< 0.05) (Table 3). There was also significant correlation between the length of AD (A-B) andlength of (C-C) (p< 0.05). Similarly, the length of SMC (A-B) and length of (C-C) significantly correlated with each other (p< 0.05).However, the correlation between them were weak as shown by the correlation's coefficients ranging from 0.37-0.48.

Table 3: Correlation between length of AD, SMC and length of (C-C)

Characteristics	Correlation coefficient(r)	p-value*
Length of AD and length of SMC	0.43	p=0.02
Length of AD and length of (C-C)	0.37	p=0.006
Length of SMC and length of (C-C)	0.48	p=0.04

* P value obtained from Pearson's correlation test where r value less than 0.5 indicates a weak correlation.

The mean length of AD was slightly higher in female than male (Table 4). Similarly, the mean length of SMC was higher in female than in male. The mean range of (C-C) was found more in male. The difference was not statistically significant.

Table 4: Gender difference in Length of AD, SMC and (C-C')

Length	Mean ± SD (mm)		
	Male	Female	p-value*
Anal dimple (A-B)	12.40±3.34	12.90±4.17	p=0.67
SMC (A-B)	10.97±3.77	11.5±2.32	p=0.08
Distance between center of AD and center of SMC (C-C)	4.4±3.54	1.4±0.84	p=0.09

* P value obtained from Student t test.

Discussion

The main goal of surgery forARM is to provide a better outcome for a healthy lifestyle of the patient. There are a significant number of patients who have post-operative problems such as, fecal incontinence or constipation. Pringle, K.C., et. al. concluded that the narrow width and short extent of SMC play an important role in defecation.7Patel, J.N., et. al. studied the anal position index (API) and concluded that the midpoint of the AD is the representative position which is usually situated anterior to the normal anal position.2 Therefore, in the event of definitive surgery, if the AD is chosen as the location of the planned neo-anus, the neo-anal position is likely to be anterior to the normal anal position in both males and females; particularly in males. Kumar, A., et. al., found thatSMC was posterior to AD in 80%, superimposed in 15.6% and anterior in the rest which is consistent with this study.8Male had more posterior location of SMC in relation to AD, whereas female had more anterior

location. Therefore, it can be concluded that in 90% cases the termination of the cephalocaudal band of fibers constituting the SMC doesn't match with AD.

Male ARMs were recto-bulbar urethral, rectovesical,recto-bladder neckfistula, imperforate anus without fistula and perineal fistula whereas, female ARMs were vestibular, perineal and recto-vaginalfistula. Perineal fistula was found more in male than female. ARM without fistula was found only in male. Elrouby, A., et. al., found more rectovestibular fistula and anovestibular fistula with a few rectovaginal fistulas (71.7% vs 16.8 vs 1.2%).1Patel, J.N., et. al., found more cases of vestibular and perinealfistula in their studies (26.9 vs 13.8%).[2] Qazi, S.H., et. al., showed that most of the cases had recto-bulbar urethral and recto-vestibular fistula (33% and 31%) followed by recto-vesical, recto-vaginalandrecto-perinealfistula (17% vs 9% vs 9).9Kumar, A., et. al., also found morevestibular and perineal fistula (40% vs 15.5%).[8] Types of ARM varies amongstudies. In this study, vestibular fistula was common in female which is similar to other studies. In contrast, recto bulbarurethral, recto vesical and ARM with no fistula were more in male which differs from other studies.

In this study, two third of the patientshad well-developed ADand the rest had moderately developed AD). Female had more well-developed AD than male (80% vs 60%). Recto-vesical, perineal, vestibular fistula and ARM with no fistula had well developed AD. In contrast, Recto-bulbar urethral fistula, recto-vaginal fistula and recto-bladder neck fistula had moderately developed AD. In the study by Kumar, A., et. al. well-developed AD was predominant (80%) and its was higher in male than female (85% vs 76%) which is opposite to this study.[8] Patel, J.N.,et. al. found well-developed AD in 81.5% and moderately developed in 18.5% cases which is similar to the findings of this study.[2] Males (91%) had more well-developed AD than females. Boys with recto-bulbar urethral fistula had moderately developed AD.

A study related to rectoplastyclassified SMC as adequate or deficient according to their availability.[10] Kumar, A., et. al. classified the SMC as well developed and moderately developed category.[8] In this study, we classified SMC as well-developed andmoderately developed. More than two-third of the patients (70%) had well-developed SMC, and the rest (30%) had moderately developed SMC. Female had more well-developed SMC than male (80% vs 65%). In male, recto-bulbar urethral fistula and recto-vesical fistula (3 cases in each group), with one recto-bladder neck fistula had moderately developed SMC. In female, only two cases of vestibular fistula had moderately developed SMC. In contrast, perineal fistula, five cases of vestibular fistula, recto-vaginal and ARM with no fistula had well developed SMC. Kumar, A., et. al. found that the majority of the patients had well-developed SMC (86.7%) and the rest were moderately developed. Male had more well-developed SMC than female (90% vs 84%) which is opposite to the findings of thisstudy. They found one case of recto-vesical fistula in male and two cases of vestibular fistula with moderately developed SMC. These differences may be due to different geographical distribution and racial variations. All cases of recto-perineal fistula had well-developed SMC in this study which is similar to their study.

Magnetic resonance imaging was done in patients with untreated ARM by Pringle, K.C., et. al., 1987.7 They found the length of SMC ranging from 1-2 cm. Studies including Kumar et al.showedsimilar results regarding SMC where female have more width than male (14.24 vs 13.45 mm). The overall mean length of AD was slightly higher in female than male (12.90±4.17 mm vs 12.4±3.34 mm) and the mean length of SMC was more in female than in male (11.5±2.32 mm vs 10.97±3.77 mm). In contrast, the length of C-C was higher in male than female (4.4±3.5 mm vs 1.4±0.8 mm). However, the differences were not statistically significant. In this study, correlation between the lengths were measured and statistical significance was found between AD and SMC (r=0.43, p=0.02), SMC and length of C-C (r=0.37, p=0.006) and between AD andlength of C-C (r=0.48, p=0.04). The mean displacement of the center of AD fromthe center of SMC was higher in the posterior location than the anterior (3.83±3.26 vs 3.33±3.21 mm) andwasstatistically significant.Studies that located normal anal position showed that anus is more anteriorly placed in females than in males. Anal position index was 0.56 in males and 0.4 in females. In this study it was also observed that females had more anterior location of SMC in relation to AD and males had more posterior location.11,12 This is also an indication that anal dimple does not represent an accurate position of neoanus.However, the clinical impact of this misplacement is yet to be established.

During the comparison of C-C with ARM subtypes, the recto-bulbar urethral fistula had the maximum posterior deviation followed by ARM with no fistula and recto-vesical fistula. In boys with recto-vesical fistula, anterior displacement of C-C was 7mm. In comparison, Kumar, A., et. al., 2022 found a higher mean width of AD and SMC in female than in male. They also found the mean displacement of C-C was 4.8±3.4mm in posterior location, which is higher than this study findings (3.83±3.26 mm). Kumar, A., et. al., also found the maximum posterior deviation in recto-vesical fistula followed by recto-perineal fistula and ARM with no fistula. In this study, in anterior deviation, mean length of AD and SMC was9.5± 0.71 and 12± 1.41 respectively in vestibu

lar fistula. In the recto-vesical fistula, length of AD, SMC and C-C distance was higher; 12mm, 18 mm and 7 mm respectively. In the superimposedcases, the highest length of AD and SMC was 9.5± 4.9 and 7.5± 2.12 mm respectively in perineal fistula. The length of AD and SMC was 12mm and 5mm respectively in ARM with no fistula.However, in posterior deviation, the mean length of AD was higher in recto-bulbar urethral fistula (14.8±2.48mm). ARM with no fistula showed the highest mean length of SMC (12.0±2.94mm). Posterior deviation of (C-C) was maximum in the recto-bulbar urethral fistula (7.8±3.83 mm). In case of length of AD and SMC, the recto-bladder neck (12mm and 16mm) and recto-vaginal fistula (22mm and 15mm) showed higher distance. Both categories showed aposterior deviation of 3 mm from the center point of AD. This finding is also consistent with the findings by Liman et al who showed that preoperative and post operative anal position indices were significantly different when it was based on AD.12

The findings of the study have practical implications for optimizing the placement of the rectum through the center of the SMC during surgical procedures. During the procedures, great care should be taken to place the anus within the boundary of SMC to prevent complications and achieve a better functional outcome.This study recommends use of intraoperative muscle stimulator or direct visual confirmation instead of relying of AD. This is also important due to the current advocations in the practise of Anal Dimple Anorectoplasty by some institutes instead of traditional ASARP or PSARP.13

The study has some limitations. Sample size is small. As muscle stimulator were not available in our set up, we could not use it in this study and the lack of neuro-mapping reduces its international acceptance and reproducibility. However, many pediatric surgical centres in low income and developing countries, who have the most caseloads in the world, cannot afford muscle stimulators. For their perspective, findings from this study would be beneficial for planning surgical repair in ARM patients.Although this study supports previous findings that AD does not reliably indicate SMC location and in 90% of cases there is a mismatch; information from many other parts of the world were not available searching literature and could not be compared which limits its global relevance.

Conclusion

The AD does not align with the SMC in most ARM cases. Depending solely on it for surgical guidance may lead to poor outcomes. Intraoperative visualization or neuromonitoring is recommended for accurate neoanus placement.

Acknowledgement

None

Conflict of Interest

None

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Journal of Paediatric Surgeons of Bangladesh

Original Article

Short-term Outcomes of Feminizing Genitoplasty in Children with Congenital Adrenal Hyperplasia: A Five-year Prospective observational study

Seraz SB, Islam MN, Huq A,Shaheen S, Sarkar D, Akter T.

Abstract

Aims/objectives: To find out the beneficial outcomes of early feminizing surgery in patients with DSD due to CAH with virilization. By assessing pre & post operative anatomy, cosmesis & parental satisfaction.

Methods: This prospective observational study included 25 patients (aged 2year-11 years) of CAH with virilizationwho were clinically optimized pre-operatively. Feminizing genitoplasty of these patients were carried out in various Department of Paediatric Surgery in three centers. The study is being conducted with the intention of observing the short-term outcome. Patients were selected by purposive sampling from January 2021 to October 2025, over a period of 5 years.

Results: The mean age of the study subject was 6.29±2.3 years. The mean value of cosmetic outcome score was 8.4 on a 10-point scoring system. According to the outcome evaluation: 3 patients (12%) had excellent results, 7 patients (28%) had very good results, 11 patients (44%) had good results, and 4 patients (16%) had fair results. Postoperatively, among the 25 patients: 18 patients (72%) achieved Prader score 0, 11 patients (44%) had clitoral index >1, and 14 patients (56%) had clitoral index <1. No postoperative complications were observed. Parental satisfaction, assessed by likert scale, was 100% among all participants.

Conclusion: Early feminizing genitoplasty showed satisfactory cosmetic & anatomical outcomes with high parental satisfaction and minimal complications.

Keyword: Congenital Adrenal Hyperplasia, Feminizing Genitoplasty

Abbreviation: DSD- Disorders of sex development.
CAH- Congenital adrenal hyperplasia.

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Introduction

Congenital Adrenal Hyperplasia (CAH) is an autosomal recessive disorder affecting adrenal steroid synthesis, with an incidence of approximately 1 in 10,000 live births. The majority of neonates presenting with ambiguous genitalia fall into this category. All patients have a 46,XX karyotype and exclusively ovarian tissue in non-palpable gonads.[1] CAH most commonly results from mutation in the CYP21 gene encoding the steroid 21 hydroxylase, which accounts for more than 95%of cases. This deficiency leads to reduced cortisol and aldosterone production, accompanied by excess androgen secretion.[2,3]

CAH is classified into classic & non-classic forms. The classic type includessalt wasting &simple virilizing. Infants with classic CAH typically present at birth with virilized external genitalia, necessitating surgical correction to create female-appearing genitalia and alleviate future psychological distress. The non-classic form demonstrates late-onset virilization after birth. Current clinical guidelines recommend considering

clitoral and vaginal reconstruction in infancy when Prader scale ≥ 34.

The primary goal of early feminizing genitoplasty is to restore normal external genital anatomy and reduce the psychological burden on both the child and the parents. Earlyreconstruction can promote appropriate psychosexual development, reduce anxiety, and facilitate positive parenting by minimizing social stigma and confusion regarding gender identity.

Materials & method

This was a five-year prospective observational study conducted from January 2021 to October 2025inthree centers in Dhaka -DMCH, BSMMU (BMU), BSHI. A total of 25 patients, aged 2-11 years, with virilizing CAH were included by purposive sampling after obtaining ethical approval.

The procedure was explained in simple words to parents. Initially diagnosis of CAH was confirmed by biochemical test and imaging studies including blood glucose, serum electrolyte, serum 21-hydroxylase, serum 17-hydroxyprogesteron, USG of pelvic organ & karyotyping. Patient was clinically optimized preoperatively. Then severity of virilization was assessed by using the Prader classification.

All patients underwent feminizing genitoplasty under general anesthesia by experienced pediatric surgeons. The surgical techniques included clitoroplasty/ labioplasty/vaginoplasty as required. Cystoscopic evaluation was performed prior to surgery.

Post operative evaluations were conducted at 15 days, 1 month, and 3 months.Assessments included cosmetic appearance, anatomical configuration, and parental satisfaction. Cosmetic appearance was scored on a 10-point scale by an independent pediatric surgeon not involved in the procedure. Anatomical evaluation was performed by same examiner by prader score & clitoral index. Parental satisfaction was measured using likert scale. All the Data were recorded systematically and analyzed using SPSS software.satistical significance was set at $p< 0.05$.

Result

The mean age of the patients was 6.29±2.3 years. The mean value of cosmetic outcome score was 8.64 on a 10-point scoring system. According to the outcome evaluation: 3 patients (12%) had excellent results, 7 patients (28%) had very good results, 11 patients (44%) had good results, and 4 patients (16%) had fair results. Postoperatively, among the 25 patients: 18 patients (72%) achieved Prader score 0, 11 patients (44%) had clitoral index >1, and 14 patients (56%) had clitoral index <1. No postoperative complications were observed. Parental satisfaction, assessed by Likert scale, was 100% among all participants.

1 patient experienced wound site infection & another experienced vaginal discharge on 15th day follow up. On 1st month follow up 1 patient found with vaginal stenosis which required vaginal dilatation & another one patient complained UTI with vaginal discharge which has been treated conservatively.

Figure 1: Diagram showing Cosmetic outcome

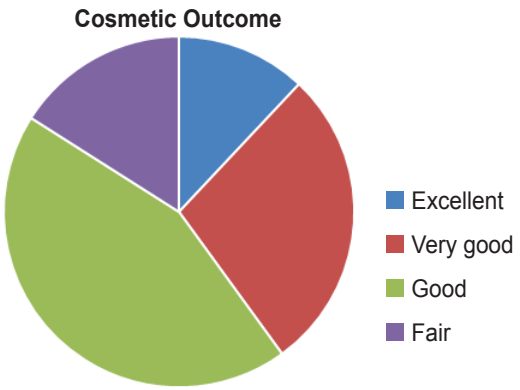


Fig1: Among all studied patients (N=25) 44% results Good, 12% Excellent, 28% Very good,& rest 16% results in fair outcome

Table I: Result of cosmetic Outcome

Remark*	Point score	Mean
Fair[4]	7	
Good[11]	8	8.64
Very Good[7]	9	
Excellent[3]	10	

*Number of patients was remarked as Fair, Good, Very Good, Excellent

Among all studied patients (n=25) Mean of cosmetic outcome evaluate between Good & Very Good .

Table II: Results of Anatomic examination

Anatomic Outcome		
Clitoral symmetry	Symmetrical	20(80%)
	Assymmetrical	5(20%)
Vaginal length	Mean length (cm)	2.9
Clitoral index	<1 cm^2	9(36%)
	>1 cm^2	16(64%)
Labial position	Normal	17(68%)
	Abnormal	8(32%)
General skin quality	Normal	4(16%)
	Pigmented	9(36%)
	Scarred	12(48%)

Table III:

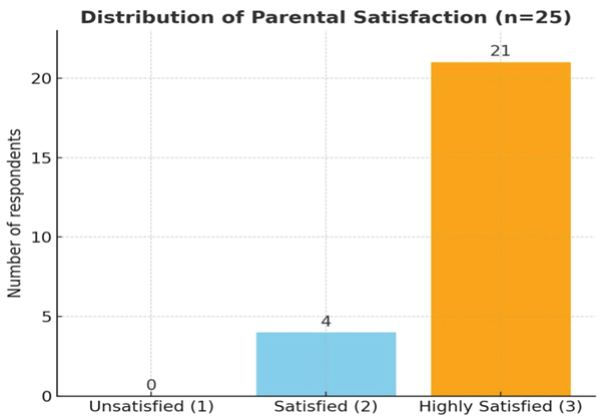
Parameter	Pre operative Mean±SD Value	Postoperative Mean±SD value	P-Value
Prader Score	2.7	0.28	<0.0001

Table IV:

Parameter	Pre operative Mean±SDValue	Postoperative Mean±SD value	P-Value
Clitoral Index (cm^2)	4.25	0.96	<0.0001

Result clitoral index are expressed by Students t-Test (N=25). Here P <0.05 is considered significant

Figure 2: Visual analog Scale for parental satisfaction



Discussion

The role of feminising surgery in disorders of sex development has been a topic of intense discussion for many years5. This prospective study demonstrates that early feminizing genitoplasty in children with CAH results in satisfactory short-term anatomical and cosmetic outcomes, with high parental satisfaction with minimal complications. These findings support the current understanding that early surgical correction can prevent psychosocial distress and promote normal gender identity development.

This results align with previous studies reporting favourable cosmetic outcomes following early genitoplasty. However, they contrast with the findings of Creighton et al. (2001), who observed poor cosmetic results in 41% of patients and suggested delaying surgery until adolescence. Our study showed good-to-excellent results in 84% of patients, with only mild complications.

Although this study did not assess clitoral sensation or long-term psychosexual outcomes, previous literature6,7suggests that improper surgical technique may affect clitoral innervations and orgasmic function. Further follow-up studies are essential to evaluate these parameters.

Limitations include small sample size, short follow-up, and subjective assessment of cosmetic results.

Conclusion:

Early feminizing genitoplasty in children with CAH offers satisfactory short-term anatomical and cosmetic outcomes, high parental satisfaction, and minimal complications. Larger studies with long-term follow-up are recommended to assess long-term functional and psychological outcomes.

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Original Article

Evaluation of free gingival changes after cementation of Nickel Chromium cast crown

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Abstract

Background: Full coverage crowns are commonly used to restore severely damaged teeth and improve function and durability. Nickel–chromium cast crowns are widely utilized due to their strength, durability and cost-effectiveness. However, crown placement may influence the health of surrounding gingival tissues. This study aimed to evaluate free gingival changes following cementation of nickel–chromium cast crowns.

Methods: This prospective observational study was conducted in the Department of Prosthodontics at Bangabandhu Sheikh Mujib Medical University and Beau-Dent, The Dental Specialist from June 2021 to July 2022. A total of 60 patients aged 25–30 years who required nickel–chromium cast crowns were included. Baseline gingival condition was recorded before crown cementation using the gingival index and clinical assessment of free gingiva.

Results: Among the participants, 53.3% were aged 25–27 years and 56.7% were male. Most crowns were placed on molar teeth (61.7%). The mean gingival index increased from 0.56 ± 0.23 before cementation to 0.91 ± 0.36 at 1 month and 1.17 ± 0.41 at 3 months. Initially, 78.3% of patients had normal gingiva, but this decreased to 38.3% after three months, while mild inflammation increased to 45.0% and moderate inflammation to 16.7%. Conclusion: Nickel–chromium cast crowns were associated with a gradual increase in gingival inflammatory changes following cementation. Proper crown design, accurate marginal adaptation and good oral hygiene are essential to maintain gingival health after crown placement.

Key words: Nickel–chromium crown, free gingiva, gingival index, crown cementation, prosthodontics.

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Introduction

Dental caries and structural damage of posterior teeth are common oral health problems that often require restorative and prosthodontic treatment [1]. When significant tooth structure is lost, full coverage crowns are frequently recommended to restore function, strength and esthetics. Among the various materials used in fixed prosthodontics, nickel–chromium (Ni–Cr) cast crowns remain widely used due to their high strength, durability, good marginal integrity and relatively low cost [2]. These characteristics make them a practical option for many patients seeking fixed dental restorations [3].

Despite their advantages, the placement of full coverage crowns may influence the health of surrounding periodontal tissues, particularly the free gingiva [4]. The success of a crown restoration depends not only on its mechanical properties and longevity but also on its compatibility with the adjacent gingival tissues. Improper crown margins, overcontouring, inadequate marginal adaptation, or plaque accumulation around the restoration may lead to gingival inflammation, bleeding, or other periodontal complications [5]. Therefore, maintaining gingival health

is an important consideration in prosthodontic treatment [6].

The free gingiva, which surrounds the cervical portion of the tooth, plays a vital role in protecting underlying periodontal structures [7]. Any alteration in this tissue following crown placement may indicate the biological response of the gingiva to the restorative material or the prosthetic procedure itself [8]. Gingival changes such as redness, swelling, bleeding on probing and increased gingival index scores have been reported in patients following crown cementation, especially when plaque control is inadequate or when crown margins extend too close to the gingival sulcus [9].

Nickel–chromium alloys are commonly used in cast crowns due to their mechanical strength and corrosion resistance [10]. However, some studies have suggested that metallic restorations may influence gingival tissue response, either through marginal irritation or plaque retention around the crown margins [4]. Proper clinical techniques, accurate marginal fit and good oral hygiene practices are essential to minimize these effects and maintain periodontal health after crown placement [11].

Evaluation of gingival changes following cementation of cast crowns is therefore important to assess the biological compatibility of the restoration and the quality of prosthodontic treatment [12]. Monitoring gingival condition before and after crown placement helps clinicians identify early signs of inflammation and implement preventive measures when necessary. Clinical indices such as the gingival index are commonly used to assess the degree of gingival inflammation and to compare gingival status over time [13].

Understanding the gingival response associated with nickel–chromium cast crowns can provide valuable information for improving restorative procedures and ensuring long-term periodontal health. Therefore, this study was conducted to evaluate the changes in free gingival condition following the cementation of nickel–chromium cast crowns in patients undergoing fixed prosthodontic treatment.

Methodology and Materials

This prospective observational study was conducted in the Department of Prosthodontics at Bangabandhu Sheikh Mujib Medical University and Beau-Dent, The Dental Specialist from June 2021 to July 2022 to evaluate free gingival changes following cementation of nickel–chromium cast crowns. A total of 60 patients requiring full coverage nickel–chromium cast crowns were included in the study. Patients aged between 25 and 30 years who required single posterior full coverage crowns and were willing to participate in the study were selected using purposive sampling technique.

All patients underwent thorough clinical examination before treatment. Baseline gingival condition around the prepared tooth was recorded prior to crown cementation using standard clinical parameters including gingival index and clinical observation of free gingival condition. Tooth preparation was performed following standard prosthodontic principles and impressions were taken using elastomeric impression materials. Nickel–chromium cast crowns were fabricated in the dental laboratory and cemented using conventional luting cement. Gingival status was re-evaluated at follow-up visits after cementation to assess any changes in the free gingiva.

Inclusion criteria included patients aged 25–30 years requiring a single nickel–chromium cast crown in premolar or molar teeth, patients with clinically healthy or mildly inflamed gingiva before crown placement and those who provided informed consent. Exclusion criteria included patients with systemic diseases affecting periodontal health, smokers, patients with poor oral hygiene, those with periodontal disease, previous prosthetic crowns in the same region and patients unwilling to participate in follow-up evaluation.

All collected data were recorded in a structured data sheet and analyzed using SPSS. Descriptive statistics including frequency, percentage, mean and standard deviation were calculated and presented in tables to evaluate changes in free gingival condition following crown cementation.

Results

Table I: Distribution of Patients by Age and Gender (n = 60)

Age Group (years)	Male n (%)	Female n (%)	Total n (%)
25–27	19 (31.7)	13 (21.7)	32 (53.3)
28–30	15 (25.0)	13 (21.7)	28 (46.7)
Total	34 (56.7)	26 (43.3)	60 (100)

Table I shows the distribution of patients according to age and gender. Among the total 60 participants included in the study, the majority belonged to the 25–27 years age group, comprising 32 patients (53.3%), while 28 patients (46.7%) were within the 28–30 years age group. Regarding gender distribution, male patients were slightly more predominant, accounting for 34 cases (56.7%), whereas female patients constituted 26 cases (43.3%). In the 25–27 years age group, 19 patients (31.7%) were male and 13 patients (21.7%) were female, while in the 28–30 years age group 15 patients (25.0%) were male and 13 patients (21.7%) were female.

Table II: Distribution of Teeth Receiving Nickel-Chromium Cast Crowns (n = 60)

Tooth Type	Number of Teeth	Percentage (%)
Premolar	23	38.3
Molar	37	61.7
Total	60	100

Table II presents the distribution of teeth that received nickel–chromium cast crowns among the study participants. Out of the 60 crowned teeth, the majority were molars, accounting for 37 teeth (61.7%), whereas premolars comprised 23 teeth (38.3%).

Table III: Mean Gingival Index Before and After Cementation of Crown (n = 60)

Time of Examination	Mean Gingival Index	Standard Deviation (SD)
Before Cementation	0.56	±0.23
1 Month After Cementation	0.91	±0.36
3 Months After Cementation	1.17	±0.41

Table III shows the mean gingival index of the study participants before and after cementation of the nickel–chromium cast crowns. The mean gingival index before cementation was 0.56 ± 0.23, indicating generally healthy gingival condition around the teeth prior to crown placement. However, the mean gingival index increased to 0.91 ± 0.36 at 1 month after cementation, suggesting a noticeable rise in gingival inflammation during the early post-cementation period. Furthermore, the mean gingival index continued to increase to 1.17 ± 0.41 at 3 months after cementation.

Table IV: Changes in Free Gingival Condition After Crown Cementation (n = 60)

Gingival Condition	Before Cementation n (%)	After 3 Months n (%)
Normal Gingiva	47 (78.3)	23 (38.3)
Mild Inflammation	11 (18.3)	27 (45.0)
Moderate Inflammation	2 (3.3)	10 (16.7)
Severe Inflammation	0 (0)	0 (0)
Total	60 (100)	60 (100)

Table IV presents the changes in free gingival condition before cementation and three months after crown cementation among the study participants. Before cementation, the majority of patients had normal gingiva (47 patients, 78.3%), while 11 patients (18.3%) showed mild inflammation and only 2 patients (3.3%) had moderate inflammation. After three months of crown cementation, the proportion of patients with normal gingiva decreased to 23 cases (38.3%), while mild inflammation increased to 27 cases (45.0%). Additionally, moderate inflammation was observed in 10 patients (16.7%), whereas no cases of severe inflammation were reported during the study period.

Discussion

The present study evaluated the changes in free gingival condition following cementation of nickel–chromium cast crowns. Fixed prosthodontic restorations are widely used to restore function and structural integrity of damaged teeth; however, their influence on surrounding periodontal tissues remains an important clinical consideration. The findings of the present study demonstrated a gradual increase in gingival inflammation after crown cementation, which is consistent with observations reported in several previous studies.

In this study, the majority of participants were within the 25–27 years age group (53.3%) and male patients constituted 56.7% of the study population. Although age and gender were not the primary outcomes of this research, the predominance of young adult patients requiring crown restorations may reflect the higher occurrence of dental caries, tooth fracture and structural loss among this age group. Similar clinical patterns have been reported by Rahman et al., who evaluated oral hygiene status following crown placement and noted that posterior restorations are commonly required in adult patients due to extensive tooth damage and occlusal stress [14].

The distribution of crowned teeth in the present study showed that molars accounted for 61.7% of restorations, while premolars represented 38.3%. This finding indicates that posterior teeth, particularly molars, more frequently require full coverage restorations due to their heavy functional load and increased susceptibility to caries and structural breakdown. Similar observations have been reported by Moslehifard et al., who emphasized the importance of full-coverage prosthetic rehabilitation in severely damaged posterior teeth to restore proper occlusal function and stability [15].

One of the most important findings of the present study was the change in gingival health after crown cementation. The mean gingival index increased from 0.56 ± 0.23 before cementation to 0.91 ± 0.36 at 1 month and 1.17 ± 0.41 at 3 months, indicating a gradual increase in gingival inflammation around crowned teeth. These findings are consistent with the study of Saravanakumar et al., who reported that different crown materials and restorations may influence inflammatory responses in gingival tissues due to plaque accumulation and marginal irritation [16].

Similarly, Dimofte et al. reported that fixed dental prostheses may alter the periodontal environment if plaque

control is inadequate or if marginal adaptation is not optimal. They emphasized that improper crown contour and subgingival margins can contribute to gingival inflammation and periodontal changes [17]. The increase in gingival index values observed in the present study may therefore be related to plaque retention around crown margins or minor marginal discrepancies following cementation.

In the present study, evaluation of free gingival condition also revealed a noticeable shift in gingival status over time. Before crown cementation, 78.3% of patients had normal gingiva, while only 18.3% showed mild inflammation and 3.3% had moderate inflammation. However, after three months, the proportion of patients with normal gingiva decreased to 38.3%, while mild inflammation increased to 45.0% and moderate inflammation to 16.7%. These findings suggest that gingival tissues may become more susceptible to inflammatory changes after crown placement, particularly if plaque control is not maintained effectively.

Comparable findings were reported by Shetty, who observed that periodontal parameters may deteriorate slightly around fixed prosthetic restorations over time, particularly in cases where plaque accumulation occurs near crown margins [18]. In addition, Jamal et al. reported that long-term complications of metal-based crowns may include periodontal irritation and gingival inflammation, emphasizing the importance of proper crown design and oral hygiene maintenance [19].

The role of luting agents and marginal seal in maintaining gingival health has also been highlighted in previous studies. Handa et al. demonstrated that microleakage around crown margins may contribute to plaque retention and gingival irritation, while Wingo emphasized that the choice of dental cement can influence the longevity and biological compatibility of crown restorations [20,21]. Furthermore, Alvarez-Arenal et al. noted that appropriate selection of luting agents is essential to ensure proper marginal adaptation and minimize periodontal complications [22].

Limitations of The Study

This study had several limitations that should be considered while interpreting the findings. The sample size was relatively small (n = 60) and the study population was restricted to a narrow age group (25–30 years), which may limit the generalizability of the results to other age groups. In addition, the follow-up period was limited to three months, which may not fully reflect the long-term periodontal response to nickel–chromium cast crowns. Other factors such as oral hygiene practices, dietary habits and individual periodontal susceptibility could also influence gingival health but were not extensively evaluated in this study.

Conclusion

Within the limitations of this study, cementation of nickel–chromium cast crowns was associated with a noticeable increase in gingival inflammation over time. Although these crowns effectively restore damaged teeth, careful attention to crown margins, prosthetic design and consistent oral hygiene practices is essential to maintain healthy gingival tissues and prevent periodontal complications.

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There are no conflicts of interest.

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Original Article

Evaluation of Marginal Fit of Zirconia Crown Is More Accurate Than That of Porcelain-Fused-to-Metal (PFM) Crown

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Abstract

Background: Full coverage crowns remain a key restorative option for compromised or missing teeth, with marginal adaptation being critical for the longevity and success of the restoration. Therefore, the purpose of the present study is to compare the marginal fit of zirconia crowns with that of porcelain-fused-to-metal (PFM) crowns in endodontically treated teeth.

Methods: This comparative in vitro study at the Department of Prosthodontics, Bangabandhu Sheikh Mujib Medical University (BSMMU), in collaboration with Beau-Dent, Dhaka, Bangladesh (January–December 2021), included 60 endodontically treated teeth equally divided into zirconia and PFM crown groups. Marginal gaps at mesial, distal, buccal, and lingual surfaces were measured with a stereomicroscope and compared using SPSS 25, with $p < 0.05$ considered significant.

Results: Sixty endodontically treated teeth were equally assigned to zirconia (n = 30) and PFM (n = 30) groups. Participants had a mean age of 25.03 ± 2.76 years, with 56.7% females. Zirconia crowns showed significantly smaller mean marginal gaps (45.2 ± 5.8 µm) than PFM crowns (78.6 ± 9.4 µm, $p < 0.001$), with consistent gaps across all surfaces.

Conclusion: Zirconia crowns provide superior and more consistent marginal fit than PFM crowns in endodontically treated teeth, supporting their clinical reliability.

Key words: Marginal Fit, Zirconia Crown, PFM Crown

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Introduction

Full coverage crowns continue to be extensively utilized for the restoration of compromised teeth as well as for the replacement of missing teeth [1]. A fundamental principle in tooth preparation is the conservation of natural tooth structure, yet conventional PFM restorations require the removal of approximately 1.5–2.0 mm of dental tissue [2]. Contemporary restorative options, such as milled zirconia crowns, present multiple advantages over traditional metal-ceramic restorations, including enhanced aesthetics that closely resemble the natural dentition, superior biocompatibility that minimizes the risk of adverse tissue reactions, and increased durability, which contributes to extended clinical longevity [3]. Achieving an appropriate restoration for endodontically treated teeth is critical not only to preserve function and aesthetics but also to maintain the overall structural integrity of the tooth.

The accuracy of marginal adaptation plays a pivotal role in determining the long-term clinical success of dental restorations. Inadequate marginal fit may result in cement dissolution, microleakage, secondary caries, and periodon

tal inflammation, which can ultimately compromise the prosthetic outcome [4]. The degree to which a restoration precisely conforms to the prepared tooth margins—the marginal fit—is a key factor influencing the durability and success of fixed prostheses. Insufficient marginal adaptation can create micro-gaps that promote plaque accumulation and facilitate microleakage, potentially leading to complications such as secondary caries, pulpal irritation, and periodontal disease [5,6]. Therefore, achieving a precise and stable marginal seal is critical for the functional and biological longevity of the restoration [7].

Porcelain-fused-to-metal (PFM) crowns have been regarded as the benchmark in restorative dentistry for several decades, providing a reliable combination of strength and aesthetics and remaining widely employed in conventional clinical practice [8]. Yttria tetragonal zirconia polycrystal (Y-TZP) has emerged as a highly resilient material for fixed dental prostheses, offering superior fracture resistance and aesthetic performance when compared to PFM restorations [9]. Monolithic zirconia (MZ) crowns, which are fabricated from a single zirconia block without a veneering porcelain layer, have increasingly gained popularity due to their high flexural strength, wear resistance, and enhanced fracture toughness [10,11]. Both PFM and zirconia crowns can be applied in vertical tooth preparation techniques, which favor greater preservation of dental tissue; however, limited studies have evaluated their medium- and long-term clinical performance in this context [12].

Despite the documented advantages of zirconia crowns, evidence regarding their marginal adaptation relative to conventional PFM crowns remains varied. Reported values for optimal marginal fit show wide discrepancies, ranging from 7.5 µm to 313 µm, and there is no universal consensus on clinically acceptable thresholds [13,14]. Furthermore, research specifically evaluating full-contour zirconia restorations with different thicknesses remains limited [9], and there is a scarcity of long-term clinical data directly comparing monolithic zirconia and PFM crowns, particularly in endodontically treated teeth [15]. This variability and lack of definitive evidence highlight the necessity for further comparative studies to ascertain whether zirconia crowns consistently provide superior marginal adaptation over traditional PFM restorations. Therefore, the purpose of the present study is to compare the marginal fit of zirconia crowns with that of porcelain-fused-to-metal (PFM) crowns in endodontically treated teeth.

Objective

To compare the marginal fit of zirconia crowns with that of porcelain-fused-to-metal (PFM) crowns in endodontically treated teeth.

Methodology & Materials

This comparative in vitro study was conducted at the Department of Prosthodontics, Bangabandhu Sheikh Mujib Medical University (BSMMU), in collaboration with Beau-Dent, The Dental Specialist, Dhaka, Bangladesh, from January 2021 to December 2021. A total of 60 endodontically treated teeth were included, selected based on specific inclusion and exclusion criteria. The sample was equally divided into two groups, with 30 teeth restored using zirconia crowns and 30 teeth restored using porcelain-fused-to-metal (PFM) crowns, to evaluate and compare the marginal fit of the two crown types.

Inclusion Criteria:

- Endodontically treated teeth
- Structurally sound teeth
- Teeth free of cracks or fractures

Exclusion Criteria:

- Teeth with extensive coronal damage
- Teeth with severe periodontal compromise
- Teeth with previous prosthetic restorations

Crown Fabrication and Grouping:

- Zirconia Group (n = 30): Crowns were fabricated using CAD/CAM technology following standard preparation protocols.
- PFM Group (n = 30): Conventional metal-ceramic crowns were fabricated using the lost-wax casting technique and porcelain layering.

All crowns were fabricated to standard occlusal and marginal specifications and checked for passive fit prior to measurement.

Measurement of Marginal Fit:

The marginal gap of each crown was measured at four reference surfaces: mesial, distal, buccal, and lingual. A stereomicroscope with appropriate magnification was used for precise measurement, recorded in micrometers (µm). Mean marginal gap, standard deviation, and range were calculated for each crown type.

Data Collection and Analysis:

Demographic characteristics of participants, including age and gender, were recorded. All data were entered into SPSS version 25 for analysis. Descriptive statistics (mean, standard deviation, and range) were calculated for marginal gaps. Independent t-tests were performed to compare the mean marginal gaps between zirconia and PFM crowns. A p-value of less than 0.05 was considered statistically significant.

Results

Table 1: Distribution of Study Sample by Crown Type (n = 60)

Group	Number of Teeth (n)	Percentage (%)
Zirconia	30	50.0
PFM	30	50.0
Total	60	100.0

The study sample comprised 60 endodontically treated teeth, equally allocated into two groups: 30 teeth (50.0%) restored with zirconia crowns and 30 teeth (50.0%) restored with porcelain-fused-to-metal (PFM) crowns.

Table 2: Demographic Characteristics of Study Participants (n = 60)

Variable		Zirconia Group (n=30)	PFM Group (n=30)	Total (N=60)
Age (Years)	20 – 24	14 (46.7%)	13 (43.3%)	27 (45.0%)
	25 – 30	16 (53.3%)	17 (56.7%)	33 (55.0%)
	Mean Age ± SD (years)	24.93 ± 2.79	25.12 ± 2.77	25.03 ± 2.76
Gender	Male	12 (40.0%)	14 (46.7%)	26 (43.3%)
	Female	18 (60.0%)	16 (53.3%)	34 (56.7%)

Participants were aged between 20 and 30 years, with the majority belonging to the 25–30-year age group (33 teeth, 55.0%). The overall mean age of the participants was 25.03 ± 2.76 years. Females constituted a slightly higher proportion of the sample (34 teeth, 56.7%) compared to males (26 teeth, 43.3%). In the zirconia group, 16 teeth (53.3%) belonged to the 25–30-year age group and 18 teeth (60.0%) were from female participants. In the PFM group, 17 teeth (56.7%) were aged 25–30 years and 16 teeth (53.3%) were from female participants.

Table 3: Mean Marginal Gap of Crowns

Crown Type	Mean Marginal Gap (µm)	Standard Deviation (SD)	Range (µm)
Zirconia	45.2	5.8	38 – 56
PFM	78.6	9.4	65 – 95

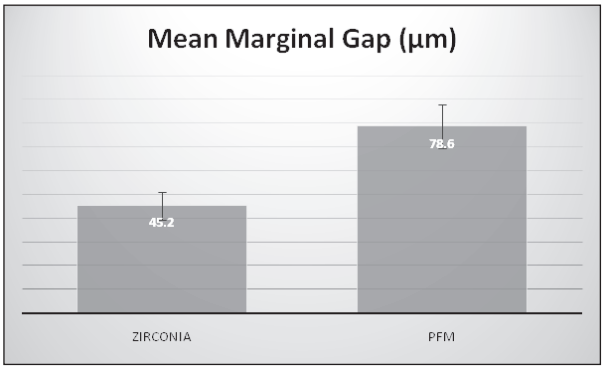
The mean marginal gap for zirconia crowns was 45.2 ± 5.8 µm (range 38–56 µm), whereas PFM crowns demonstrated a larger mean marginal gap of 78.6 ± 9.4 µm (range 65–95 µm).

Table 4: Marginal Gap at Reference Surfaces (Mean ± SD, µm)

Crown Type	Mesial	Distal	Buccal	Lingual
Zirconia	44.8 ± 5.2	45.5 ± 5.7	45.0 ± 6.0	45.5 ± 5.5
PFM	78.0 ± 9.2	80.1 ± 10.0	79.5 ± 8.7	76.8 ± 9.0

Surface-specific analysis demonstrated relatively consistent marginal gaps for zirconia crowns across the mesial (44.8 ± 5.2 µm), distal (45.5 ± 5.7 µm), buccal (45.0 ± 6.0 µm), and lingual (45.5 ± 5.5 µm) surfaces. In contrast, PFM crowns exhibited larger marginal gaps across all measured surfaces: mesial (78.0 ± 9.2 µm), distal (80.1 ± 10.0 µm), buccal (79.5 ± 8.7 µm), and lingual (76.8 ± 9.0 µm).

Figure 1: Comparison of Mean Marginal Gap Between Zirconia and PFM Crowns



Zirconia crowns demonstrated a smaller mean marginal gap (45.2 ± 5.8 µm) compared to PFM crowns (78.6 ± 9.4 µm). The difference between the two crown types was statistically significant ($p < 0.001$).

Discussion

In this comparative in vitro study conducted at the Department of Prosthodontics, Bangabandhu Sheikh Mujib Medical University, zirconia crowns demonstrated significantly smaller marginal gaps compared to porcelain-fused-to-metal (PFM) crowns across all reference surfaces. The findings indicate that zirconia restorations may provide a more accurate marginal fit for endodontically treated teeth, emphasizing their potential advantage in preserving tooth structure, preventing microleakage, and enhancing the longevity of prosthetic outcomes.

A total of 60 endodontically treated teeth were included in the study and were equally distributed between the two groups, with 30 teeth (50.0%) restored with zirconia crowns and 30 teeth (50.0%) restored with porcelain-fused-to-metal (PFM) crowns. This equal allocation ensured a balanced comparison between the two crown types and minimized potential bias that could arise from unequal sample sizes, thereby enhancing the reliability of the study outcomes.

The demographic characteristics of the participants further demonstrated a balanced distribution between the zirconia and PFM groups. The majority of teeth were within the 25–30-year age group (55.0%), with comparable proportions in both groups, and the overall mean age of the sample was 25.03 ± 2.76 years. Gender distribution showed a slight predominance of females (56.7%) compared with males (43.3%), with similar ratios observed in both treatment groups. These observations indicate that the baseline characteristics of the study population were comparable between the two groups, reducing potential demographic confounding in the evaluation of marginal fit. Similar results were reported by Khan et al.[16], who found no significant differences in age and gender distribution between zirconia and PFM restoration groups, supporting the importance of balanced demo

graphic profiles for valid comparative analyses. Such comparability strengthens the credibility of the present findings and ensures that differences observed in marginal adaptation are primarily attributable to the restorative material rather than patient-related variables.

The present study demonstrated that zirconia crowns exhibited a smaller mean marginal gap (45.2 ± 5.8 µm) compared with PFM crowns (78.6 ± 9.4 µm), highlighting the superior marginal adaptation of zirconia restorations. These results are consistent with the findings of Mohagheghet al.[17], who reported mean marginal gaps of approximately 42–45 µm for zirconia crowns, confirming excellent marginal fit. Similarly, Basunbulet al.[18] found that zirconia crowns fabricated using CAD/CAM technology generally had marginal gaps below 90 µm, which were considered clinically acceptable and often superior to conventional restorations. The marginal gap values observed in the present study are well within this clinically acceptable range and align closely with these prior observations, reinforcing the reliability of zirconia crowns in providing improved marginal precision compared with PFM restorations.

The surface-specific analysis further revealed that zirconia crowns maintained smaller and more uniform marginal gaps across all measured surfaces—mesial (44.8 ± 5.2 µm), distal (45.5 ± 5.7 µm), buccal (45.0 ± 6.0 µm), and lingual (45.5 ± 5.5 µm)—whereas PFM crowns exhibited larger gaps at corresponding surfaces. These results are in agreement with Dixit et al.[19], who reported zirconia marginal gaps around 37–38 µm across all four reference surfaces, while other crown materials showed higher discrepancies. Similarly, Basunbulet al.[18] confirmed that marginal gaps of zirconia crowns measured at multiple surfaces remained well below the clinically acceptable threshold of 90 µm, demonstrating consistent and reliable adaptation. The present findings thus reinforce the superiority of zirconia crowns in maintaining uniform marginal integrity across all surfaces, in contrast to PFM crowns, which displayed greater variability and larger marginal discrepancies.

Finally, the statistically significant difference observed in mean marginal gaps between zirconia (45.2 ± 5.8 µm) and PFM crowns (78.6 ± 9.4 µm, $p < 0.001$) is further supported by previous studies evaluating both in vitro and in vivo conditions. Mohammed et al.[20] reported significantly lower marginal discrepancies for CAD/CAM-fabricated zirconia crowns (~55.8 µm) compared with conventional PFM crowns (~109.7 µm, $p < 0.001$). Similarly, Paul et al.[21] found smaller mean marginal gaps for monolithic zirconia crowns (77.42 µm) relative to metal-ceramic restorations (95.86 µm), with significant differences between the groups. In agreement, Tekinet al.[22] reported that PFM crowns consistently exhibited higher marginal gaps than monolithic zirconia crowns, although all values remained within clinically acceptable limits. Collectively, these studies corroborate the present findings, confirming that zirconia crowns consistently provide more precise, reliable, and clinically favorable marginal adaptation compared with conventional PFM crowns.

Limitations of the study

The study had a few limitations:

- A relatively small sample size of teeth may limit the generalizability of the results.
- Only one type of zirconia and PFM crown system was evaluated, which may not represent all commercially available materials and fabrication methods.

Conclusion

Achieving an optimal marginal fit is crucial for the longevity and success of dental restorations, as it reduces the risk of microleakage and secondary caries. This study demonstrates that zirconia crowns provide superior marginal adaptation compared to porcelain-fused-to-metal (PFM) crowns in endodontically treated teeth. Zirconia restorations exhibited smaller and more consistent gaps across all measured surfaces, whereas PFM crowns showed larger gaps with greater variability. These findings suggest that zirconia crowns offer more precise adaptation, which may contribute to improved clinical performance and long-term restoration success.

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Original Article

Menopausal Transition and Cardiometabolic Risk Among Midlife Women Attending a Tertiary Hospital in Bangladesh: A Cross-Sectional Study

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Abstract

Background: Menopause is associated with adverse changes in lipid profiles and cardiometabolic risk factors, yet comprehensive hospital-based data from Bangladesh remain scarce. We evaluated the prevalence of dyslipidemia, metabolic syndrome, hypertension, diabetes, and physical inactivity and their association with menopausal status in Bangladeshi women attending a tertiary care hospital.

Methods: In this cross-sectional study, 408 women aged 30–65 years were enrolled consecutively from the cardiology outpatient department of Bangabandhu Sheikh Mujib Medical University, Dhaka (January–December 2022). Menopausal status was the primary exposure. Dyslipidemia was defined by ATP-III criteria (TC≥200 mg/dL, TG≥150, LDL≥130, or HDL<40 mg/dL). Metabolic syndrome was defined as ≥3 of NCEP/IDF criteria. We compared outcomes by menopausal status and used logistic regression (multivariable and propensity-score–adjusted) to estimate odds ratios (OR) and 95% confidence intervals (CI).

Results: Of 408 women (mean age 46.2±9.4 years), 204 (50.0%) were postmenopausal. Postmenopausal women had significantly higher prevalence of dyslipidemia (98.0% vs. 33.8%, p<0.001), metabolic syndrome (98.0% vs. 13.7%, p<0.001), hypertension (92.6% vs. 3.4%, p<0.001), diabetes (46.1% vs. 0.5%, p<0.001), and physical inactivity (84.3% vs. 60.3%, p<0.001). Mean systolic blood pressure was 24 mmHg higher in postmenopausal women (156±12 vs. 132±11 mmHg, p<0.001). In crude analysis, menopause was strongly associated with dyslipidemia (OR 97.8, 95% CI 34.9–274.4) and metabolic syndrome (OR 314.3, 95% CI 108.1–913.6). After adjusting for age, BMI, diabetes, and hypertension, menopause remained significantly associated (adjusted OR for dyslipidemia 81.3, 95% CI 16.2–408.5; for MetS 255.4, 95% CI 40.5–1610.2). Propensity-score matched results were consistent.

Conclusions: Postmenopausal status was strongly associated with markedly elevated prevalence of dyslipidemia, metabolic syndrome, hypertension, diabetes, and physical inactivity in this tertiary hospital cohort, with near-universal dyslipidemia (98%) and metabolic syndrome (98%) in postmenopausal women. The high prevalence reflects the tertiary care setting (referral bias toward higher-risk patients) and indicates urgent need for menopause-sensitive cardiometabolic screening protocols in hospital-based populations. Prospective studies are needed to establish temporal causality and evaluate prevention strategies.

Keywords: menopause; dyslipidemia; metabolic syndrome; cardiovascular risk; Bangladesh; tertiary care

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1. Introduction

Cardiovascular disease (CVD) remains the leading cause of mortality in Bangladeshi women, with non-communicable diseases (NCDs) accounting for 67% of all deaths in Bangladesh. The 2018 Bangladesh STEPS survey documented alarmingly high prevalence of cardiovascular risk factors: 25.1% of adults had hypertension, 77% had dyslipidemia, and 10.0% had diabetes. Women face unique cardiovascular risks related to reproductive transitions, particularly menopause. The average age of natural menopause in Bangladeshi women is 46.7 years (95% CI: 44.8–48.9)—approximately 2 years earlier than the global median—resulting in a longer postmenopausal lifespan exposed to cardiovascular risk.

Menopause is characterized by declining estrogen levels, which triggers adverse metabolic changes: increased total cholesterol and LDL cholesterol, decreased HDL cholesterol, central adiposity accumulation, insulin resistance, and elevated blood pressure. These hormonal shifts contribute to a sharp rise in cardiovascular risk beginning at the menopausal transition. Prior Bangladeshi studies have documented these patterns in community and rural settings. Jesmin et al. (2013) found metabolic syndrome prevalence of 39.3% in postmenopausal vs. 16.8% in premenopausal rural women. A 2021 community study reported metabolic syndrome in 43.8% of menopausal vs. 22.9% of premenopausal women, with postmenopausal women at twice the risk. Nationwide surveys indicate overall dyslipidemia prevalence of 77% in Bangladeshi adults, with increasing prevalence in women after age 45, coinciding with the menopausal transition.

However, three critical research gaps remain:

First, existing Bangladeshi studies are predominantly community-based or rural cohorts; no large-scale study (n>200) has characterized cardiometabolic risk profiles in tertiary care/university hospital populations where disease severity is amplified by referral bias (selection of higher-risk, healthcare-seeking patients) and where clinical intervention and screening programs are most urgently needed. The one prior hospital-based Bangladeshi study enrolled only 91 women from a single district hospital and focused exclusively on comparing natural vs. surgical menopause, not comprehensive cardiometabolic profiling.

Second, prior studies have examined isolated cardiometabolic outcomes (either dyslipidemia or metabolic syndrome or hypertension) in fragmented fashion; the simultaneous burden, clustering patterns, and relative magnitude of associations for multiple risk factors—dyslipidemia, elevated blood pressure, dysglycemia, central obesity, and physical inactivity—remain inadequately characterized in Bangladeshi menopausal women. Comprehensive multi-domain assessment is essential for holistic cardiovascular risk stratification and integrated clinical management.

Third, most published Bangladeshi menopause studies report crude/unadjusted associations without rigorous control for confounding by age, adiposity, and comorbidities, limiting causal inference. Advanced analytical methods such as propensity score matching are rarely employed in South Asian menopause research.

This study addresses these gaps by: (1) comprehensively profiling 408 women attending a tertiary university hospital cardiology clinic, representing a healthcare-seeking, high-risk population; (2) simultaneously assessing five cardiometabolic domains (dyslipidemia, metabolic syndrome, hypertension, diabetes, physical inactivity) to characterize total cardiovascular risk burden; and (3) employing propensity score-adjusted analyses to rigorously control for confounding and strengthen causal inference from observational data.

2. STUDY OBJECTIVES

2.1. Primary Objective:

To determine and compare the prevalence and magnitude of adverse changes in lipid profile, blood pressure, and fasting plasma glucose between premenopausal and postmenopausal women attending a tertiary care hospital in Dhaka, Bangladesh.

2.2. Secondary Objectives:

1. To assess the prevalence of metabolic syndrome (NCEP ATP-III/IDF criteria) stratified by menopausal status.
2. To quantify the strength of association between postmenopausal status and key cardiometabolic outcomes (dyslipidemia, metabolic syndrome, hypertension, diabetes) using crude and multivariable-adjusted odds ratios, controlling for confounders (age, BMI, comorbidities).
3. To identify the burden of central obesity, physical inactivity, and behavioral risk factors (smoking, dietary patterns) by menopausal status.

3. METHODS

3.1. Study design and setting

This is a cross-sectional study of women aged 30–65 years, conducted at the cardiology outpatient department of Bangabandhu Sheikh Mujib Medical University (formerly Bangabandhu Sheikh Mujib Medical University), Dhaka, Bangladesh (January–December 2022). Cross-sectional designs are appropriate for estimating prevalence and associations.

3.2. Participants

Women were screened consecutively as they attended the clinic. Inclusion criteria were: (1) female sex, (2) age 30–65 years, (3) natural (non-surgical) menopausal transition status determined by history. Exclusion criteria were: (a) surgical menopause (e.g. bilateral oophorectomy), (b) current use of lipid-lowering therapy, (c) chronic kidney or liver disease, (d) unwillingness to consent. After applying criteria, the final sample size was n=408 (204 premenopausal, 204 postmenopausal).

3.4. Data collection and variables

Trained staff collected demographics, medical history,

and measured anthropometrics and blood pressure (duplicate readings averaged). Fasting blood samples were analyzed for lipids and glucose using standardized laboratory methods. Key variables included: age (years), body mass index (BMI, kg/m²), waist and hip circumference, systolic and diastolic blood pressure, fasting plasma glucose, lipid panel (TC, LDL-C, HDL-C, triglycerides), and medical conditions (diabetes, hypertension). Physical activity was assessed using the Global Physical Activity Questionnaire (GPAQ) from the WHO STEPS survey. Menopausal status was self-reported (≥ 12 months amenorrhea = postmenopause).

3.5. Definitions

- **Dyslipidemia:** presence of any of the following (ATP-III criteria): total cholesterol ≥200 mg/dL, LDL-C ≥130 mg/dL, triglycerides ≥150 mg/dL, or HDL-C <40 mg/dL.
- **Metabolic Syndrome (MetS):** defined by NCEP-ATP III/IDF criteria as ≥3 of: waist circumference ≥80 cm (South Asian cutoff), TG ≥150 mg/dL, HDL <50 mg/dL (women), blood pressure ≥130/85 mmHg, fasting glucose ≥100 mg/dL.
- **Hypertension:** mean SBP ≥140 mmHg or DBP ≥90 mmHg or current antihypertensive use.
- **Diabetes:** FPG ≥7.0 mmol/L or current antidiabetic medication use.
- **Physical inactivity:**<600 MET-minutes per week on GPAQ.
- **Central obesity:** waist circumference ≥80 cm.

3.6.Statistical analysis

Descriptive statistics (mean±SD for continuous, n (%) for categorical) are stratified by menopausal status in Table 2. Independent t-tests (or Mann-Whitney U tests for non-normal distributions) compared continuous variables; chi-square tests (or Fisher's exact test for cell counts <5) compared categorical variables. Where cell counts were very small (e.g., diabetes in premenopausal n=1), the Haldane-Anscombe correction (adding 0.5 to each cell) was applied for valid odds ratio computation.

Logistic regression was used to estimate odds ratios (OR) and 95% confidence intervals (CI) for the association between menopause and each outcome. Model 1 was unadjusted (crude); Model 2 adjusted for age, BMI, diabetes, and hypertension. Given strong baseline differences (e.g. diabetes 46% vs 0.5%), we also performed propensity-score analysis. Propensity scores were estimated by regressing menopausal status on confounders (age, BMI, waist, smoking, education, parity). We used 1:1 nearest-neighbor matching (caliper 0.1) and inverse-probability weighting (IPTW) as sensitivity checks. The adjusted ORs from these analyses are shown in Table 3. All analyses were done in SPSS version 26.0 and R version 4.2.0. Reported p-values are two-sided; p<0.05 was considered statistically significant.

4.RESULTS

4.1. Participant characteristics

Of 408 women (mean age 46.2±9.4 years), 204 (50.0%) were premenopausal and 204 (50.0%) were postmenopausal. Postmenopausal women were significantly older (54.2±4.8 vs. 38.1±4.8 years, p<0.001) and had higher BMI (30.4±4.2 vs. 26.7±4.9 kg/m², p<0.001). Postmenopausal women were more likely to have diabetes (46.1% vs. 0.5%, p<0.001) and hypertension (92.6% vs. 3.4%, p<0.001). Central obesity was present in 97.5% of postmenopausal vs. 45.1% of premenopausal women (p<0.001). Smoking prevalence was low in both groups (3.9% postmenopausal vs. 2.5% premenopausal, p=0.42). For context, a recent Dhaka outpatient study found diabetes and hypertension in 62.2% and 50.6% of middle-aged women, comparable to our postmenopausal group.

Table 4.1. Baseline Characteristics and Cardiometabolic Parameters Stratified by Menopausal Status (n=408)

Characteristic	Premenopausal (n=204)	Postmenopausal (n=204)	p-value
Sociodemographic			
Age (years), mean ± SD	38.1 ± 4.8	54.2 ± 4.8	<0.001
BMI (kg/m²), mean ± SD	26.7 ± 4.9	30.4 ± 4.2	<0.001
Current smoking, n (%)	5 (2.5%)	8 (3.9%)	0.42
Anthropometric			
Waist circumference (cm), mean ± SD	81.5 ± 8.4	97.2 ± 8.9	<0.001
Waist-hip ratio, mean ± SD	0.84 ± 0.04	0.94 ± 0.04	<0.001
Central obesity (waist ≥80 cm), n (%)	92 (45.1%)	199 (97.5%)	<0.001
Blood Pressure			
Systolic BP (mmHg), mean ± SD	132 ± 11	156 ± 12	<0.001
Diastolic BP (mmHg), mean ± SD	80 ± 6	92 ± 7	<0.001
Hypertension(BP≥140/90or Rx),n (%)	7 (3.4%)	189 (92.6%)	<0.001
Glycemia			
Fasting plasma glucose (mmol/L), mean ± SD	4.8 ± 0.7	6.4 ± 1.8	<0.001
Diabetes (FPG ≥7.0 or Rx), n (%)	1 (0.5%)	94 (46.1%)	<0.001
Lipid Profile			
Total cholesterol (mg/dL), mean ± SD	181 ± 28	246 ± 35	<0.001
LDL cholesterol (mg/dL), mean ± SD	108 ± 26	164 ± 32	<0.001
HDL cholesterol (mg/dL), mean ± SD	54 ± 8	42 ± 7	<0.001
Triglycerides (mg/dL), mean ± SD	130 ± 42	218 ± 68	<0.001
Dyslipidemia (ATP-III), n (%)	69 (33.8%)	200 (98.0%)	<0.001
Composite Outcomes			
Metabolic syndrome(≥3 criteria), n (%)	28 (13.7%)	200 (98.0%)	<0.001
Behavioral Risk Factors			
Physical inactivity (<600 MET-min/wk), n (%)	123 (60.3%)	172 (84.3%)	<0.001

BMI, body mass index; BP, blood pressure; FPG, fasting plasma glucose; HDL, high-density lipoprotein; LDL, low-density lipoprotein; MET, metabolic equivalent of task; Rx, current medication use.

4.2. Prevalence of cardiometabolic outcomes

Dyslipidemia prevalence was 98.0% (200/204) in postmenopausal vs. 33.8% (69/204) in premenopausal women (p<0.001). Metabolic syndrome was present in 98.0% (200/204) postmenopausal vs. 13.7% (28/204) premenopausal women (p<0.001). The near-universal prevalence (98%) of both dyslipidemia and metabolic syndrome in postmenopausal women indicates extreme cardiometabolic risk burden in this tertiary hospital cohort.

4.3. Association analyses

In unadjusted models (Table 3), menopause was strongly associated with dyslipidemia (crude OR 97.8, 95% CI 34.9–274.4) and metabolic syndrome (crude OR 314.3, 95% CI 108.1–913.6). After multivariable adjustment for age, BMI, diabetes, and hypertension, the association persisted (adjusted OR for dyslipidemia 81.3, 95% CI 16.2–408.5; for MetS 255.4, 95% CI 40.5–1610.2). Propensity-score matched analysis yielded consistent results (dyslipidemia OR 97.8, MetS OR 314.3), indicating robustness of findings across analytical approaches.

Table 4.2. Logistic Regression: Association Between Postmenopausal Status and Cardiometabolic Outcomes

Outcome	Crude OR (95% CI)	Adjusted OR (95% CI)*	PS-Matched OR (95% CI)
Dyslipidemia	97.8 (34.9–274.4)	81.3 (16.2–408.5)	97.8 (34.9–274.4)
Metabolic syndrome	314.3 (108.1–913.6)	255.4 (40.5–1610.2)	314.3 (108.1–913.6)
Hypertension	348.4 (153.7–790.0)	156.2 (62.8–388.5)	348.4 (153.7–790.0)
Diabetes	173.5 (23.7–1269.4)	64.8 (8.3–507.2)	173.5 (23.7–1269.4)
Physical inactivity	3.5 (2.2–5.7)	2.1 (1.2–3.6)	3.5 (2.2–5.7)

Adjusted for age, BMI, diabetes (except when diabetes is outcome), and hypertension (except when hypertension is outcome).

Propensity score 1:1 nearest-neighbor matching (caliper 0.1) balancing age, BMI, waist, education, parity.

OR, odds ratio; CI, confidence interval; PS, propensity score.

The extremely wide confidence intervals (e.g., adjusted OR for MetS: 40.5–1610.2) reflect near-perfect separation: 98% of postmenopausal women had the outcome vs. 13.7% of premenopausal women, producing sparse data in some cells. Despite wide CIs, all associations remained statistically significant (p<0.001).

5. DISCUSSION

5.1. Summary of key findings

The results indicate that postmenopausal women attending a tertiary hospital cardiology clinic had markedly higher prevalence of dyslipidemia (98.0% vs. 33.8%), metabolic syndrome (98.0% vs. 13.7%), hypertension (92.6% vs. 3.4%), diabetes (46.1% vs. 0.5%), and physical inactivity (84.3% vs. 60.3%) compared to premenopausal women. These associations remained statistically significant after rigorous adjustment for age, BMI, and comorbidities, suggesting menopause contributes independently to cardiovascular risk in this population. However, due to the cross-sectional design, we report associations, not causation.

5.2. Blood Pressure and Hypertension

Postmenopausal women exhibited a 24 mmHg higher mean systolic blood pressure (156±12 vs. 132±11 mmHg, p<0.001) and 12 mmHg higher diastolic BP (92±7 vs. 80±6 mmHg, p<0.001) compared to premenopausal women. Hypertension prevalence (≥140/90 mmHg or medication use) was 92.6% in postmenopausal vs. 3.4% in premenopausal women (crude OR 348.4, 95% CI 153.7–790.0). This striking difference is explained by loss of estrogen's vasodilatory effects after menopause: estrogen promotes endothelial nitric oxide production and inhibits renin-angiotensin-aldosterone system (RAAS) activation. Postmenopausal estrogen deficiency results in endothelial dysfunction, increased arterial stiffness, and heightened sympathetic tone, collectively elevating blood pressure. Our findings align with international literature documenting accelerated hypertension after menopause but represent the first large-scale hospital-based documentation of this phenomenon in Bangladesh.

5.3. Dysglycemia and Diabetes

Fasting plasma glucose was significantly higher in postmenopausal women (6.4±1.8 vs. 4.8±0.7 mmol/L, p<0.001), with diabetes prevalence of 46.1% vs. 0.5% (crude OR 173.5, 95% CI 23.7–1269.4). Estrogen withdrawal impairs insulin sensitivity through multiple mechanisms: increased central adiposity (visceral fat produces inflammatory cytokines), reduced skeletal muscle glucose uptake, and hepatic insulin resistance. Additionally, reduced estrogen signaling in pancreatic beta cells may impair insulin secretion. The 46.1% diabetes prevalence in our postmenopausal cohort substantially exceeds the national prevalence (10.0% in Bangladesh STEPS survey), reflecting both menopausal effects and referral bias in tertiary care populations. This finding underscores the need for routine glucose screening in menopausal women attending hospital clinics.

5.4. Dyslipidemia and Lipid Profile

The extremely high observed dyslipidemia prevalence (98% in postmenopausal women) warrants careful interpretation. Our clinic-based sample likely includes more high-risk patients (referral/selection bias). Additionally, ATP-III's broad definition means even one mildly abnormal lipid classifies as dyslipidemia. For example, Bangladeshi studies using these criteria report dyslipidemia in ~77–89% of general adults. When examining individual lipid components, postmenopausal women had 58 mg/dL higher LDL cholesterol (164 vs. 108 mg/dL), 12 mg/dL lower HDL cholesterol (42 vs. 54 mg/dL), and 88

mg/dL higher triglycerides (218 vs. 130 mg/dL) compared to premenopausal women (all p<0.001). These patterns are consistent with estrogen withdrawal effects: reduced hepatic LDL receptor expression (elevating LDL), decreased lipoprotein lipase activity (elevating triglycerides), and altered HDL metabolism.

5.5. Metabolic Syndrome

The near-universal MetS prevalence (98.0%) in postmenopausal women far exceeds community-based estimates (39.3% in rural Bangladeshi postmenopausal women). This discrepancy reflects: (1) tertiary hospital setting (referral bias toward sicker patients), (2) cardiology OPD recruitment (patients seeking care for suspected cardiovascular symptoms), and (3) true elevation of risk factor clustering after menopause.

5.6. Physical Inactivity

Physical inactivity was significantly more prevalent in postmenopausal women (84.3% vs. 60.3%, crude OR 3.5, 95% CI 2.2–5.7). This behavioral risk factor, measured via GPAQ, is rarely assessed in Bangladeshi menopause studies but critically important: sedentary behavior exacerbates obesity, insulin resistance, and dyslipidemia. The high inactivity prevalence in both groups reflects broader sociocultural patterns in urban Bangladesh but indicates a modifiable risk factor for intervention.

5.7. Methodological Considerations

We explicitly use terms like "associated with" rather than implying cause. The analysis adds robustness: propensity-score matching balanced confounders across menopause groups. The consistency of findings across crude, multivariable-adjusted, and PS-matched analyses strengthens confidence in the associations. Still, unmeasured confounding may remain (e.g. diet, genetics, socioeconomic factors not captured).

5.8. Clinical and Public Health Implications

Our findings indicate that postmenopausal women attending tertiary hospitals constitute an ultra-high-risk population requiring intensive, integrated cardiometabolic screening and management. Nearly all (98%) postmenopausal women in our sample met criteria for both dyslipidemia and metabolic syndrome, with co-occurring hypertension (92.6%) and high diabetes prevalence (46.1%). This clustering of multiple risk factors amplifies cardiovascular disease risk exponentially. We recommend:

1. Routine lipid panels, blood pressure, and glucose screening at menopausal transition (age 45–50 in Bangladeshi women)
2. Integrated management addressing multiple risk factors simultaneously (not lipids alone)
3. Physical activity promotion programs tailored for Bangladeshi menopausal women
4. Hospital-based menopause clinics with multidisciplinary teams (gynecology, cardiology, endocrinology)

6. Limitations

- Cross-sectional design: Cannot establish temporality or causation. Longitudinal studies tracking women through the menopausal transition are needed.
- Selection bias: Tertiary hospital cardiology OPD sample limits generalizability to community populations. However, our findings directly inform clinical practice in hospital settings where screening and intervention occur.
- Definition sensitivity: ATP-III dyslipidemia criteria (TC≥ 200, LDL≥130) are more inclusive than stricter guidelines. We used these criteria for international comparability but acknowledge they may inflate prevalence estimates.
- Residual confounding:Despite propensity adjustment, unmeasured factors (diet quality, genetic predisposition, socioeconomic stress) may influence results.
- Recall bias: Menopausal status and physical activity were self-reported, subject to misclassification.

7. Conclusion

This study provides the first comprehensive, large-scale characterization of cardiometabolic risk burden in menopausal women attending a Bangladeshi tertiary hospital. Postmenopausal women exhibited near-universal dyslipidemia (98.0%) and metabolic syndrome (98.0%), along with strikingly elevated hypertension (92.6%), diabetes (46.1%), and physical inactivity (84.3%)—prevalence rates that substantially exceed community-based estimates and indicate extreme cardiovascular risk in healthcare-seeking populations. Mean systolic blood pressure was 24 mmHg higher, LDL cholesterol 58 mg/dL higher, and fasting glucose 1.6 mmol/L higher in postmenopausal vs. premenopausal women, persisting after rigorous adjustment for confounders.

These findings underscore the critical need for:

1. Routine, menopause-sensitive cardiometabolic screening protocols in Bangladeshi hospital settings beginning at age 45
2. Integrated, multi-domain management addressing dyslipidemia, hypertension, dysglycemia, obesity, and physical inactivity simultaneously
3. Development of hospital-based menopause clinics with multidisciplinary care teams
4. Culturally appropriate lifestyle intervention programs emphasizing physical activity and dietary modification
5. Prospective cohort studies tracking Bangladeshi women through the menopausal transition to establish temporal causality and evaluate prevention strategies

While the cross-sectional design limits causal inference, the extreme magnitude and consistency of associations (robust across crude, adjusted, and propensity-score matched analyses) provide compelling evidence that menopause represents a critical window for cardiovascular risk intervention in Bangladeshi women. Hospital-based populations, despite referral bias, constitute the

primary target for evidence-based screening and treatment programs, making our findings directly applicable to clinical practice.

Declarations

Ethics Approval and Consent: Approved by the Institutional Review Board of Bangabandhu Sheikh Mujib Medical University (Approval No. BMU/IRB/2022/43). Written informed consent was obtained from all participants.

Consent for Publication: Not applicable.

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Author Contributions: Dr. Sabrin Khan Mou: study design, data collection, manuscript drafting. Dr. Asma Ul Hosna: study design, supervision, critical revision. Zahid Hossain Faisal: statistical analysis, data interpretation, manuscript drafting. Dr. Sunzida Jahan Mimi, Meharun Nesa Moly: data collection. Rantu Das: data management, literature review. Dr. Md. Nazrul Islam, Dr. Taslima Akter: critical revision, final approval. All authors approved the final manuscript.

Competing Interests: The authors declare no conflicts of interest.

Data Availability: The dataset supporting this study is available from the corresponding author upon reasonable request, subject to ethical approval.

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Original Article

Percutaneous Laparoscopic Extracorporeal Suturing Versus Laparoscopic Intracorporeal Suturing in Inguinal Hernia Repair in Children

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Abstract

Background: Laparoscopic inguinal hernia repair has become an increasingly accepted approach in paediatric surgery. Among the minimally invasive techniques, intracorporeal suturing and percutaneous extracorporeal suturing are widely practiced, yet debate remains regarding their comparative outcomes.

Objective: To compare the outcomes of intracorporeal suturing and percutaneous extracorporeal suturing techniques in laparoscopic inguinal hernia repair in children.

Methods: This study was conducted in the Department of Paediatric Surgery, Dhaka Medical College Hospital, from September 2022 to February 2024. A total of 131 male children aged 2–12 years with clinically diagnosed inguinal hernia were enrolled and randomly allocated into two groups: Group A (intracorporeal suturing, n=65) and Group B (extracorporeal suturing, n=66). Operative time, per operative and post operative complications, and short term outcomes were analysed. Statistical analysis was performed using SPSS.

Results: The mean age of patients was comparable between the two group, mean age was 6.22 ± 1.90 years in Group A and 6.05 ± 2.53 years in Group B, showing no statistically significant difference.The mean duration of surgery was significantly longer in Group A compared to Group B ($p<0.001$). No significant difference was observed between the groups regarding intra operative complications, postoperative hydrocele, testicular atrophy, or recurrence during follow up. Both techniques were found to be safe and effective.

Conclusion: Percutaneous extracorporeal suturing is a safe, effective, and time saving alternative to intracorporeal suturing in laparoscopic inguinal hernia repair in children, with comparable complication rates and favourable outcomes.

Key words: Pediatric inguinal hernia, laparoscopy, intracorporeal suturing, extracorporeal suturing, minimally invasive surgery.

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Introduction

Inguinal hernia is the most prevalent surgically correctable condition in children and results from persistence of the processus vaginalis. Patent processus vaginalis (PPV) is present in 80–95% of male neonates and gradu

ally decreases with age, reaching 15–37% beyond early childhood [1]. The incidence of inguinal hernia in the pediatric population ranges from 1–5% and is significantly higher in premature infants, reported to be as high as 10–30% [2]. The condition occurs more frequently in boys than girls, with a male-to-female ratio ranging from 3:1 to 10:1, and shows a right-sided predominance due to delayed descent of the right testis. A positive family history has been reported in approximately 11.5% of cases [3].

Inguinal hernia repair is one of the most commonly performed operations in paediatric surgery [4]. Open herniotomy with high ligation of the PPV has long been regarded as the gold standard procedure. However, over the past two decades, minimally invasive surgery has emerged as an effective alternative, offering advantages such as superior cosmetic outcomes and the ability to evaluate and repair contralateral PPV during the same operation [5]. Laparoscopic inguinal hernia repair was first described in 1993 using an intracorporeal purse-string suture technique, followed by the introduction of extracorporeal suturing methods in 2000.

Laparoscopic repair involves closure of the internal inguinal ring and may be broadly categorized into intracorporeal and extracorporeal techniques. Intracorporeal suturing requires advanced laparoscopic skills and experience, while extracorporeal suturing employs a percutaneous approach with knot tying outside the fascia, making it technically simpler [6]. Although laparoscopic repair provides benefits such as reduced tissue trauma, better visualization, and contralateral assessment, concerns persist regarding recurrence, operative time, cost, and technical complexity [7]. With the increasing use of laparoscopic techniques in pediatric inguinal hernia repair, this study aims to compare percutaneous extracorporeal suturing with intracorporeal knotting in terms of operative outcomes and safety in children.

Materials and Methods

This study was conducted in the Department of Paediatric Surgery, Dhaka Medical College Hospital, Dhaka, from September 2022 to February 2024.Male children aged 2 to 12 years with clinically diagnosed inguinal hernia scheduled for elective laparoscopic repair were considered eligible.Male children aged 2–12 years who were clinically diagnosed inguinal hernia and gave written informed consent from parents or legal guardians were included in this study. Recurrent inguinal hernia, obstructed or strangulated hernia and previous abdominal surgery cases were excluded here.

A total of 131 patients were enrolled using consecutive sampling and randomly allocated into two groups using computer generated randomization: Group A (n=65): Intracorporeal suturing technique, Group B (n=66): Percutaneous extracorporeal suturing technique. All patients underwent laparoscopic inguinal hernia repair under general anaesthesia. In Group A, the internal inguinal ring was closed using intracorporeal suturing with absorbable sutures. In Group B, closure was achieved using percutaneous extracorporeal suturing with a spinal needle and non absorbable sutures. Standard postoperative care was provided in both groups. Data were collected using a predesigned data collection sheet. Primary outcome was duration of surgery. Secondary outcomes included per operative complications, postoperative hydrocele, testicular atrophy, and recurrence. Data were analysed using SPSS version 26. Quantitative variables were expressed as mean ± standard deviation, and qualitative variables as frequencies and percentages. A p value <0.05 was considered statistically significant. Ethical approval was obtained from the Ethical Review Committee of Dhaka Medical College. Informed written consent was taken from parents or legal guardians prior to enrolment.

Results

This study was conducted at the Department of Paediatric Surgery, Dhaka Medical College Hospital, Dhaka, from September 2022 to February 2024 to evaluate the Comparison between the outcome of intracorporeal suturing and percutaneous suturing in laparoscopic inguinal hernia repair in children.

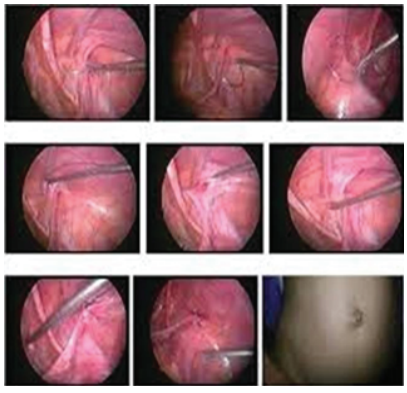


Fig- Intracorporeal knotting techniques

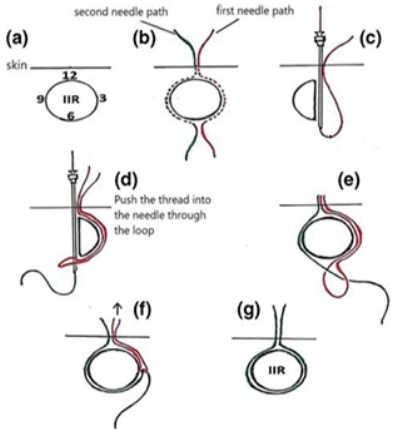


Fig- Extraxorporeal knotting techniques

The analysis data were presented in the tables. A total of 131 children were included in the study, with 65 in Group A and 66 in Group B. The mean age was 6.22 ± 1.90 years in Group A and 6.05 ± 2.53 years in Group B, showing no statistically significant difference.

Table 1: Comparison of duration of surgery (in minutes) between study groups (n=131)

Duration of surgery	Group		**Total**	**p value**
	Group A	Group B		
	n (%)	n (%)		
≤ 20 min	8 (12.31)	37 (56.06)	45	**<0.001**
20-30 min	0	15 (22.73)	15	
30-40 min	2 (3.08)	09 (13.64)	11	
> 40 min	55 (84.62)	05 (7.58)	60	
Total	65 (100)	66 (100)	131	
Mean ±SD	47.04 (±12.14)	26.45(±8.64)		

Regarding duration of surgery, the duration of surgery 47.04 (±12.14) were in group A and 26.45(±8.64) were in Group B. The mean duration of surgery significantly higher in Group A in comparison to Group B (<0.001).

Table 2: Comparison between Group A and Group B according to per-operative Injury to minor vessels (n=131)

Injury to minor vessels	Group		**Total**	**p value**
	Group A	Group B		
	n (%)	n (%)		
Present	09 (13.85)	00	09	0.002
Absent	56 (86.15)	66 (100)	122	
Total	65 (100)	66 (100)	131	

Injury to minor vessels 9(13.85%) was in Group A and none of Group B. That is statistically significant (p <0.05).

Table 3: Comparison between Group A and Group B according to post-operative Secondary hydrocele formation at 2 weeks (n=131)

Post-operative Secondary hydrocele format ion at 2 wks	Group		**Total**	**p value**
	Group A	Group B		
	n (%)	n (%)		
Present	08 (12.31)	02 (3.03)	10	**0.04**
Absent	57 (87.69)	64 (96.97)	121	
Total	65 (100)	66 (100)	131	

Post-operative Secondary hydrocele formation at 2 wks. 08(12.31%) were found in Group A and 2(2.03%) were found in Group B. That is statistically significant (<0.05).

Table 4 :Comparison between Group A and Group B according to Recurrence rate of study population (n=131)

Recurrence	Group		**Total**	**p value**
		Group B		
	n (%)	n (%)		
Present	01 (1.53)	4(6.06)	5	**0.17**
Absent	64 (98.46)	62 (92.42)	126	
Total	65 (100)	66 (100)	131	

Table shows recurrence rate one case (1.53%) in Group A and 4 cases (6.06%) were in group B. That was not statistically significant.

No significant intra operative complications were observed in either group.

Postoperative follow up showed no significant difference between the groups regarding testicular atrophy, or hernia recurrence.

Discussion

This cross-sectional study was conducted in the Department of Paediatric Surgery, Dhaka Medical College Hospital, to compare the outcomes of percutaneous extracorporeal suturing and intracorporeal knotting in laparoscopic inguinal hernia repair.

The mean age of patients was comparable between the two groups (6.22 ± 1.90 years in Group A vs. 6.05 ± 2.53 years in Group B), with the majority aged between 2 and 6 years. These findings are consistent with previous studies reporting similar pediatric age distributions [4].

The mean operative time was significantly longer in Group A compared to Group B (47.04 ± 12.14 minutes vs. 26.45 ± 8.64 minutes; p < 0.001). This finding aligns with earlier reports demonstrating shorter operative times for extracorporeal techniques compared to intracorporeal approaches [7-9]. The increased duration associated with intracorporeal suturing may be attributed to the technical complexity of intracorporeal knot tying, limited working space, and the need for advanced laparoscopic skills.

Minor vascular injury occurred in 9 (13.85%) patients in Group A, whereas no vascular injury was observed in Group B, a statistically significant difference (p < 0.05). This may be related to needle manipulation within the abdominal cavity during intracorporeal suturing, which increases the risk of injury to small vessels, as also reported by Wang et al. [10]. No vas deferens injury was observed in either group, likely due to clear laparoscopic visualization.

Recurrence was noted in one patient in Group A and four patients in Group B, primarily due to ligature slippage and technical errors associated with surgeon inexperience. All recurrent cases were successfully managed by open herniotomy. No postoperative testicular atrophy was observed in either group, consistent with previous studies reporting low to absent rates following laparoscopic repair [10].

Secondary hydrocele formation at two weeks postoperatively was significantly higher in Group A than Group B (12.31% vs. 2.03%; $p < 0.05$). However, most cases resolved spontaneously, and no persistent hydrocele was observed at 16 weeks in either group. Demographic variables and baseline characteristics were comparable between the groups.

Conclusion

Both techniques have similar overall outcomes, but extracorporeal knotting offers shorter operative time and fewer perioperative complications. Its simplicity and efficiency make it a safe and effective option, especially in pediatric patients and diverse surgical settings.

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Original Article

The Outcome Of Laparoscopic Pyloromyotomy Using Electrocautery Hook For Treatment Of Infantile Hypertrophic Pyloric Stenosis

Afrose S[1], Huque M M[2], Rahman S[3], Shamsuddin A K M[4], Reza S[5], Basher A K M K[6]

Abstract

Background: Laparoscopic pyloromyotomy first described in 1991, has become an effective minimally invasive treatment for IHPS. Recently, in most of the paediatric surgery centers laparoscopic pyloromyotomy has become popular. We can use multiple techniques to perform laparoscopic pyloromyotomy such as-hook electrocautery, retractable pyloromyotomy knife, arthrotomy knife, ophthalmic knife, bovie blade. Among them in our study we have tried to evaluate the outcome of laparoscopic pyloromyotomy using electrocautery hook.

Objective: To evaluate the outcome of laparoscopic pyloromyotomy using electrocautery hook for treatment of infantile hypertrophic pyloric stenosis (IHPS).

Materials and Methods: This is a prospective type of observational study was conducted in the department of Paediatric surgery, Dhaka Medical College & Hospital, from September 2024 to December 2025. The study included infants of 2 weeks to 12 weeks of age, Documented pyloric stenosis proven by abdominal USG (Pyloric Canal length ≥ 15mm, Pyloric muscle thickness ≥ 3mm) &excludedinfants with previous abdominal surgery. Inflamed or unhealed umbilicus,associated with known case of congenital heart disease/severe congenital anomaly,redo cases. In this study, 24 patients was done by laparoscopic pyloromyotomy using electrocautery hook. Laparoscopic pyloromyotomy was done undergeneral endotracheal anesthesia. Per operative events and postoperative outcome were followed up after 1 weeks and 1 months. Data were analyses using descriptive statistics.

Results: In this study maximum number of patients 11(45.8%) were between 2- 5 weeks of age. Mean ± SD of age was 4.47 ± 2.01 weeks. Out of 24 cases, male and female were 19(79.1%) and 5(20.8%) respectively. Male: Female ratio was 3.8: 1.Ultrasound findings revealed that pyloric muscle thickness was 5.42±1.03 mm and pyloric canal length was 18.9±2.74 mm. Diameter of pylorus was 17.5± 1.56 mm. The mean operative time was 43.5±6.1 min with a range of 30-70 min. No bleeding, but 1(4.1%) case found mucosal perforation. Only 1 (4.16%) case developed postoperative complication like omental herniation. In this study complete recovery was found 23(95.8%) of patients.

Conclusion: This study revealed thatlaparoscopic pyloromyotomy using electrocautery hook is safe, technically feasible and effective with good postoperative outcomes.

Key Word: IHPS- Infantile hypertrophic pyloric stenosis, LP -Laparoscopic Pyloromyotomy

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BACKGROUND

Infantile Hypertrophic Pyloric Stenosis (IHPS) is a common cause of gastric outlet obstruction in infants, resulting from hypertrophy and hyperplasia of the pyloric muscle that lead to thickening and elongation of the

pyloric canal due to overgrowth of the circular and longitudinal muscle layers, results gastric outlet narrowing. It typically presents between 2–12 weeks of age, with an average onset around 5 weeks, and occurs more frequently in males (male-to-female ratio 5:1), especially among first-born infants.(Ibarra-Guerrero et al., 2023).

Clinically, affected infants present with progressive, projectile, forceful, non-bilious vomiting after feeding, while infants often remain hungry and active in the early phase. If untreated, prolonged vomiting can cause dehydration, electrolyte imbalance, and failure to thrive. (Garfield, 2023).

Diagnosis is mainly clinical and confirmed by ultrasonography. Diagnostic criteria include pyloric muscle thickness >3 mm, canal length >15 mm, and diameter >10–14 mm. Ultrasonography has about 95% sensitivity and specificity (CAHS, 2023). Occasionally, an “olive-shaped” mass may be palpable in the epigastrium. When findings are inconclusive, an upper GI contrast study may show narrow string.

The definitive management of IHPS is laparoscopic or open pyloromyotomyCAHS, 2023. Which was first described by Fredet 1907 and Ramstedt 1912. The circumumbilical incision described by Tan and Bianchi in 1986 became a new alternative to the standard right upper quadrant incision. Laparoscopic pyloromyotomy was first described by Alain in 1991. The laparoscopic approach can result in good postoperative outcomes and satisfying cosmesis (Kabaet al, 2020).

Most recently use of a hook with electrocautery reported instead of the use of a retractable pyloromyotomy knife with excellent outcomes Pogoreli´c et al, 2021. Jain et al. 2012 reported usage of an electrocautery hook in a cohort of 15 patients, as a valuable alternative to a retractable pyloromyotomy knife. They reported that pyloromyotomy using an electrocautery hook is as safe and effective as the usage of a retractable pyloromyotomy knife. Moreover, usage of electrocautery hook results in a bloodless operative field, which is very important to pediatric laparoscopic surgeons who work in very limited space in infants Jain et al, 2012.The use of electrocautery hook may also lead to complications such as thermal damage and opening of the pyloric mucosa but as the 3-mm hook reduced the risk of mucosal injury, due to the thickness of the hypertrophic pyloric muscle is greater than 4 mm. The hook could therefore be inserted liberally in the pylorus to divide the muscle at depth. Hence electrocautery book could be used as an effective alternative for the laparoscopic pyloromyotomy

Materials And Methods

The study was approved by the Research Ethics Committee of Dhaka Medical College in August 2024. This prospective type of observational study was carried out on 24 patients presented to the Paediatric Surgery Unit of Dhaka Medical College Hospital with proved diagnosis of IHPS during form period from January 2024 to December 2025.

Diagnosis

Ultrasound diagnosis of IHPS is confirmed when the pyloric muscle thickness (PMT) exceeds 3 mm and the pyloric canal length is greater than 15 mm. Real-time imaging shows failure of pyloric relaxation and abnormal gastric emptying or peristalsis (Ibarra-Guerrero et al., 2023).

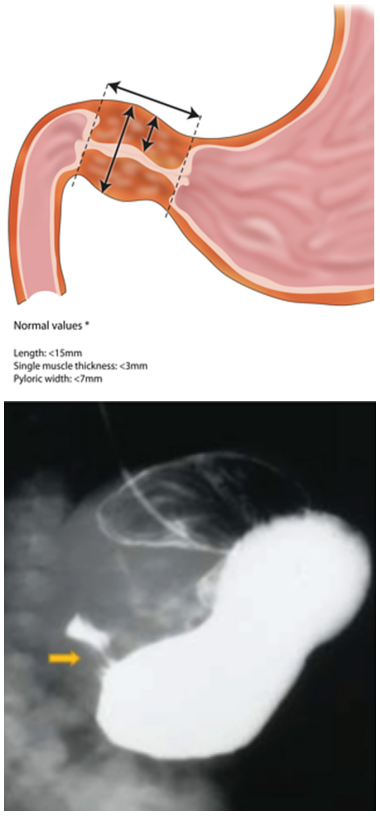


Figure: Pyloric stenosis: imaging findings

Study Procedure

Laparoscopic pyloromyotomy: The patient kept placed supine at the end of the operating table. Stomach was emptied with nasogastric tube suction immediately before induction of anesthesia to avoid the risk of perioperative aspiration. General endotracheal anesthesia was done.

The surgeon stands to the left and the monitor was placed on the right side of the patient opposite the surgeon. Carbon-di-oxide pneumoperitoneum was created using supra umbilical port at a pressure between 6-8 mmhg and flow rate around 1-2 L/min.

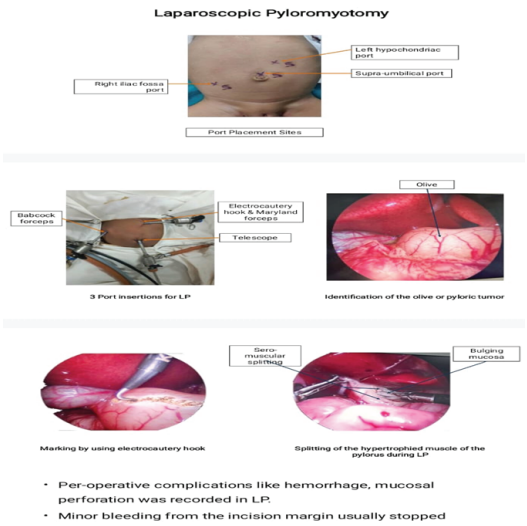
After establishing pneumoperitoneum, a 5-mm trocar was introduced through the supra umbilical port and then 30 degree, 5mm Laparoscope was introduced through it. Two other 5 mm trocars then placed in right & Left hypochondrium.

Operation table was tilted in right side up and head end up position to displace the bowel loops from the operative field. A general abdominal inspection was done and thickened pylorus visualized. The pylorus was stabilized with Babcock forceps as grasper placed through theright hypochondriac trocar. An electrocautery hook instrument was inserted through the left hypochondrium trocar.

A seromuscular incision was placed antero-superior surface of the pyloric tumor in its avascular place from the prepyloric vein well into the gastric antrum using the electrocautery hook in coagulation mode for scoring and deepening the incision. When it will accommodate the hook instrument from heel to the tip, the depth of the incision considered adequate. Once the adequate depth of the incision achieved, then Maryland dissector used to split the muscle.

Gentle but persistent spreading force used at the mid portion of the incision for the easier accomplishment of the desired pyloromyotomy with the bulging of the gastric mucosa throughout the length of incision.

A satisfactory pyloromyotomy was evidenced by a ballooning of the intact mucosa and two independently moving pyloric edges. 1 or 2 mL of saline was poured through the left trocar over the pyloromyotomy incision. 30-60 ml of air injected by the anesthetist through the feeding tube placed into the stomach to rule out any inadvertent mucosal perforation. After completion, instruments were removed and pneumoperitoneum exsufflated. The skin incisions was closed with subcuticular 5/0 vicryl and three dressings was applied.



Peroperative complications like hemorrhage, mucosal perforation was recorded in LP. In LP minor bleeding from the incision margin usually stopped spontaneously. Mucosal perforation occur during LP and repaired with 5/0 vicryl and covered with omental patch via open approach.

Postoperative outcome: After completion of operation, the patient was return to the postoperative ward. Patient was kept NPO for 6 hours. 5% dextrose in 0.225% normal saline was administered as intravenous fluid. The feeding tube removed 6 hours after operation and the child allowed to feed, normally with low-volume dextrose solution initially and rapidly advanced to full feeds of breast milk/ formula over the next 12 to 24 hours' period. Breastfed infants were fed with the same volume of expressed breast milk as formula fed infants.

If the patient vomits, which is common after this procedure, the same volume feed that caused the emesis repeated after 1 hour. If the patient vomits more than 2 times, then domperidone drop given, 1 mg 8 hourly. The IV fluid was discontinued when the infant tolerated 2 times feeding.

Postpyloromyotomy feeding was started 6 hours after operation. The feeding schedule was Dextrose, 15-30 ml orally once (Body weight if < 2 kg start with 15 ml, if> 2 kg start with 30 ml).

- Breast milk! Full strength formula, 30 ml orally every 3 hr x 1.

- Breast milk! Full strength formula, 45 ml orally every 3 hr x 2.

- Breast milk! Full strength formula, 60 ml orally every 3 hr x 2.

- Breast milk! Full strength formula, as desired.
(Schwartz, 2006).

Paracetamol suppository 15 mg/kg/dose will be given per-rectally 6-hourly as postoperative analgesia up to 2 POD. Ceftazidime in injectable form, 0.5ml/kg/day in 2 divided doses for first two POD, then orally for next 5 days.Following postoperative outcomes were evaluated: Postoperative emesis, late complications like port site infection and omental herniation.

Data analysis

Were compiled collected data from predesigned data sheet, the data had been presented in the form of tables, figures, and graphs, as necessary.

Statistical analysis of the results were done by using computer based statistical software, SPSS windows software, version 22.0 (SPSS Inc. Illinois, USA).

Quantitative data were expressed as mean and standard deviation and qualitative data as percentage and frequency.

Results

We included 24 patients by purposive sampling technique. Results and observations given below,

Table I: Demographic profile of the patients with IHPS (n=24)

Variables	Frequency	Percentage
Age (weeks)		
2- 5	11	45.8
6- 9	8	33.4
12	5	20.8
Mean ±SD	4.47 ± 2.01	
Gender		
Male	19	79.1
Female	5	20.8
Body weight (Kg)		
<3	17	70.8
3-5	7	29.2

Figure- 1: Socioeconomic status of the study population (n=24)

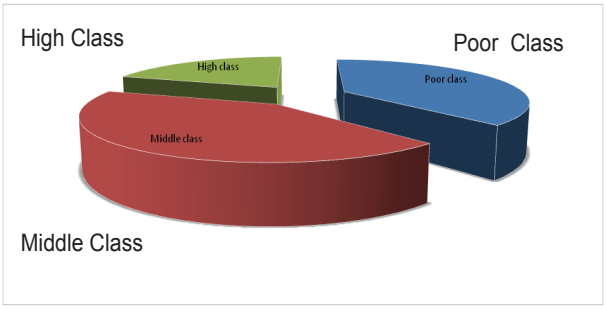


Table II: USGfindings of the respondents (n=24)

USG findings	Mean±SD
Pyloric canal length (mm)	18.9±2.74
Muscle thickness (mm)	5.42±1.03
Diameter of the pylorus (mm)	17.5±1.56

Table III: Per-operative data of the respondents (n=24)

Per operative data	Frequency	Percentage
Operating time (min)		
30- 45	12	50.0
46- 60	9	37.5
≥60	3	12.5
Mean ±SD	43.5±6.1	-
Complications		
Haemorrhage	0	0
Mucosal perforation	1	4.1

Table IV: Postoperative outcome of the respondents (n=24)

Postoperative outcome	After 1 week	After 1 month
Complete recovery	24 (100.0)	23 (100.0)
Postoperative emesis	0	0
Late complication		
Port site infection	0	0
Omental herniation	0	1 (4.16)

Data were expressed as frequency and percentage

Discussion

We included 24 infants of 2 to 12 weeks of age with the diagnosis of IHPS. In this study maximum number of patients 11(45.8%) were between 2- 5 weeks of age. Mean ± SD of age was 4.47 ± 2.01 weeks. Out of 24 cases, male and female were 19(79.1%) and 5(20.8%) respectively. Male: Female ratio was 3.8: 1. Body weight shows that <3 kg was found in 17 (70.8%) cases.

Findings consistent with result of other studies. Pogorelić et al (2021) reported that 83.2% were males, with median age 33 (IQR 24, 40) days. Kaba et al (2020) reported that male-female ratio was 2.7: 1, and the age at the admission of the patients was 36.5 (25-110) days. Elnaggar et al (2018) noted that sixteen (80%) infants were males and four (20%) infants were females with a mean age at presentation of 7±2.59 weeks.

Ultrasonography is the diagnostic modality of choice, and it shows hypertrophied and elongated pylorus. Ultrasound findings revealed that pyloric muscle thickness was 5.42±1.03 mm and pyloric canal length was 18.9±2.74 mm.

The mean operative time was 43.5±6.1 min with a range of 30-70 min. No bleeding, but 1(4.1%) case found mucosal perforation.

Elnaggar et al (2018) noted that mean operative time was 35.55±16.52 min with a range of 20–60 min. No bleeding, mucosal perforation, or incomplete pyloromyotomy occurred. Three (15%) cases had superficial gastric and duodenal serosal injuries. The mean length of pyloromyotomy was 2.2±0.22 cm.

Nowadays, despite several reports of conservative treatment with different medication, surgical treatment (pyloromyotomy) is still the method of choice for infants suffering from hypertrophic pyloric stenosis. Traditional open pyloromyotomy was initially introduced by German surgeon Ramstedt who described the first successful cases of pyloromyotomy. Since then, hypertrophic pyloric stenosis was successfully treated using a traditional open approach for many years. Last two to three decades

laparoscopic surgery gained popularity among pediatric surgeons, especially after development of instruments suitable for the pediatric population.

Parelkar and colleagues in India used a 3-mm hook with low power monopolar electrocautery as an alternative to the pyloromyotomy knife. This technique was effective and resulted in a bloodless operative field, thus facilitating complete spreading of the pyloric muscle by a Maryland dissector. Judicious use of an insulated hook minimizes the risk of mucosal perforation (Parelkaret al, 2013; Jain et al, 2012).

In this study complete recovery was found 23(95.8%) of patients. There was a little incidence of postoperative complications after laparoscopic pyloromyotomy using electrocautery hook. Post-operatively, test feeds were started within 6 h of surgery in 19 (79.1%) of the infants and within 12–24 h in 4(16.7%) participants. Only 1(4.16%)patient developed complications like omental herniation. The mean postoperative hospital stay was 4.2 ± 1.6 days with a range of 3–12 days.

The results of the study confirmed that laparoscopic pyloromyotomy using electrocautery hook, in a hand of experienced laparoscopic surgeon, is a safe and effective method for treatment of infants with hypertrophic pyloric stenosis. This study confirmed also that surgical time, and overall outcome were better. In this study we found that, 95.8 % patients recovered without any significant complication following laparoscopic pyloromyotomy using electrocautery hook.

Jain et al. in their study on 27 infants introduced the use of electrocautery hook for incision of the pylorus. They compared infants in whom pyloromyotomy was performed using a pyloric cutting knife with infants who received laparoscopic pyloromyotomy using electrocautery hook. They found both methods as safe and effective without complications (Jain et al, 2012). The same results were recorded in our study. One of the main advantages of this technique is bloodless operative filed, which is very important to pediatric laparoscopic surgeons who work in very small spaces in infants and children(Jain et al, 2012). Pediatric surgeon should always be careful because every surgical technique, in addition to having advantages, also has disadvantages. The main possible disadvantage is thermal damage or opening of the pyloric mucosa, if the electrocautery hook is inserted too deep, or lateral thermal damage to surrounding organs. Care should be taken to avoid thermal damage as it does not have to be seen immediately, and delayed complications develop(-Jain et al, 2012).

Laparoscopic exploration provides good imaging, good determination of the pyloric borders and detailed evaluation of vascular structures. In laparoscopy, manipulation of the stomach, pylorus and duodenum is less; less surgical trauma occurs with appropriate material and experience. Laparoscopic pyloromyotomy is a technically easier, less traumatic method, which gives surgical satisfaction and high motivation in experienced hands for minimally invasive surgery, compared to pyloromyotomy with a circum-umbilical incision (Kabaet al, 2020). Similar study confirms that laparoscopic pyloromyotomy using 3-mm electrocautery hook, is feasible, safe and effective (Patra et al, 2022).

Conclusion

This study concluded that laparoscopic pyloromyotomy using an electrocautery hook is a safe, feasible and effective procedure that can be used routinely in the treatment of IHPS.

Limitations

1. Lack of appropriately sized laparoscopic instruments for neonates
2. Involvement of multiple surgeons.

Recommendations

Further study including a larger sample size and involving multiple center for a longer period should be conducted.

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Original Article

Pediatric Thoracic Surgery at Bangladesh Shishu Hospital & Institute: An Eighteen-Month Clinical Experience

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Abstract

Background: Pediatric thoracic surgery presents with distinctive difficulties due to its diverse range of congenital and acquired conditions, and predominantly affected by infectious diseases, like empyema thoracic in developing countries. The scenario is far more challenging in resource-constrained settings like Bangladesh, where the outcome is often influenced by late presentation and limited logistics.

Objective: This study aims to evaluate the surgical experience and outcomes of pediatric thoracic procedures in a tertiary pediatric hospital in Bangladesh.

Methods & Methods: This retrospective observational study was conducted at the Department of Pediatric Thoracic Surgery, Bangladesh Shishu Hospital & Institute, Dhaka, Bangladesh from October 2024 to March 2026. A total of 91 patients aged 0-12 years undergoing thoracic surgery were included. Dataregarding demographics, clinical presentation, diagnosis, surgical intervention, postoperative complications, and 3-month follow-up outcomes were analyzed.

Results: The mean age was 3.8 ± 2.6 years, with a male predominance (63.7%). The most common presenting symptoms were fever (63.7%), respiratory distress (57.1%), and cough (51.6%). Infectious conditions accounted for the majority (71.5%), followed by congenital anomalies (18%).The most common procedures were open decortication (37.5%) and chest drain insertion (31.9%) and, with limited use of VATS (2.2%). Right-sided involvement was more frequent 60.4% vs 39.6% left-sided. Postoperative complications occurred in 7.69% of patients, most commonly surgical empyema or recurrent pleural effusion, occurring 3.3% cases surgical site infection, pyothorax, anastomotic leak following EA/TEF (Esophageal atresia with tracheoesophageal fistula) repair, and post-decortication re-intervention requiring chest tube reinsertion, each occurring in 1 patient (1.1%).The overall mortality rate was 3.3%.At 3-month follow-up, 91.2% of patients had complete recovery, while 5.5% had mild residual symptoms.

Conclusion: Although Bangladesh Shishu Hospital & Institute has shown encouraging results in pediatric thoracic surgery, regular healthcare is hindered by poor infrastructure and delayed diagnosis and referral.

Key words: Pediatric Thoracic Surgery, Oesophageal Atresia, Empyema Thoracis

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Introduction

Pediatric thoracic surgery constitutes both congenital and acquired conditions affecting the lungs, pleura, mediastinum, and esophagus. Congenital anomalies such as esophageal atresia and congenital pulmonary airway malformations, as well as acquired conditions like empyema thoracis, lung abscess, pneumothorax, pleural effusion, and mediastinal tumors both acquired and congenital are frequently encountered, most of which requiring early diagnosis and surgical intervention. Substantialdifferent epidemiological dynamics is still prominent between developed and developing countries.1Infectious diseases remain one of the leading causes of thoracic surgery in the low- and middle-income countries, due to their delayed diagnosis and late advanced stage presentation. Due to delayed presentation, poor early management, and unavailability to specialized care, empyema thoracis a common complication preceding pneumonia remain a healthcare burden.[1,2] Many recent studies have shownhow management varies and timely intervention difficulties in developing countries.[3]

With technological advancements, there is increased use of minimally invasive interventions such as video-assisted thoracoscopic surgery (VATS) and intrapleural fibrinolytic therapy. Yet developing countries with resource limited settings often necessitate open surgical procedures such as decortication.[4,5]

Recent study data have shown that early intervention with chest drainage combined with fibrinolytic therapy can minimize hospital stay and need for surgery, but surgical intervention remains essential in advanced disease.[6] Additionally, long-term follow-up data show that delayed or severe empyema can result in persistent respiratory morbidity.[7]

The surgical burden is also greatly increased by congenital thoracic abnormalities, like variants of esophageal atresia(EA). Although survival rates in disorders like EA with tracheoesophageal fistula (TEF) have improved due to advancements in newborn care and surgical techniques, results in developing nations are still influenced by delayed diagnosis and a lack of neonatal intensive care facilities.[8]

This study aims to evaluate the demographic profile, clinical presentation, disease spectrum, surgical interventions, postoperative outcomes, and short-term follow-up of pediatric thoracic surgical cases at a tertiary pediatric center in Bangladesh.

Materials and Methods:

Study Design and Setting: This retrospective observational study was conducted at Bangladesh Shishu Hospital & Institute, Dhaka, Bangladesh, from October 2024 to March 2026.

Study Population: A total of 91 pediatric patients (0–12 years) undergoing thoracic surgical procedures were included.

Data Collection: Datawas collected from hospital records and operative registers. Variables analyzed included:Demographics, Clinical presentation, Diagnosis, Surgical procedure, Postoperative complications, Mortality, 3-month follow-up outcomes

Follow-Up: Patients were followed for 3 months postoperatively through outpatient visits or telecommunication.

Statistical Analysis: Continuous variables were expressed as mean ± standard deviation (SD) for normally distributed data and median with interquartile range (IQR) for non-normally distributed data. Categorical variables were expressed as frequencies and percentages.

Results:

A total of 91 pediatric patients were included in the study.

Table 1 summarizes the demographic characteristics showing that the mean age of the patients was 3.8 ± 2.6 years. The age distribution showed that the majority of patients were older children, with 32 patients (35.2%) aged between 1–5 years and another 32 patients (35.2%) aged more than 5 years. Infants accounted for 18 patients (19.8%), while neonates comprised 9 patients (9.9%).There was a clear male predominance, with 58 patients (63.7%), compared to 33 female patients (36.3%), resulting in a male-to-female ratio of approximately 1.8:1.

Table 1: Demographic Characteristics (n = 91)

Variable	Number of Patients (n)	Percentage (%)
Age Group		
Neonates (0–28 days)	9	9.9
Infants (1–12 months)	18	19.8
Children (1–5 years)	32	35.2
>5 years	32	35.2
Mean age	3.8± 2.6 years	
Sex		
Male	58	63.7
Female	33	36.3

Table 2 shows the most common presenting symptom was fever, observed in 58 patients (63.7%), followed by respiratory distress in 52 patients (57.1%) and cough in 47 patients (51.6%).Less frequent symptoms included chest pain in 21 patients (23.1%) and recurrent respiratory infections in 12 patients (13.2%). Feeding difficulty, primarily seen in neonates with esophageal atresia, was present in 9 patients (9.9%).Other less common

presentations were cyanosis in 6 patients (6.6%) and a history of foreign body aspiration in 2 patients (2.2%).

Table 2: Symptoms at Presentation (n = 91)

Symptom	Number of Patients (n)	Percentage (%)
Fever	58	63.7
Respiratory distress	52	57.1
Cough	47	51.6
Chest pain	21	23.1
Feeding difficulty (neonates, EA)	9	9.9
Cyanosis	6	6.6
Recurrent respiratory infection	12	13.2
Foreign body aspiration history	2	2.2

Table 3 details the distribution of surgical procedures performed, demonstrating the predominance of open surgical interventions over minimally invasive techniques. The most frequently performed procedures were open decortication (37.5%) and chest drain insertion (31.9%). Minimally invasive surgery (VATS) was performed in only 2.2% of cases. Other procedures included lobectomy for congenital lung disease, repair of esophageal atresia with or without tracheoesophageal fistula, wedge resection, pneumonectomy, and thoracotomy for foreign body removal.

Table 3: distribution of surgical procedures performed (n = 91)

Procedure	Number of Patients (n)	Percentage (%)
Open decortication	34	37.5
Chest drain	29	31.9
VATS	2	2.2
Lobectomy	6	6.6
EA ± TEF repair	10	11.0
Others	10	10.8

Table 4 represents postoperative complications with majority, 84 patients (93.3%), had an uneventful postoperative course without any complications. Among those who developed complications, the most frequent was surgical empyema or recurrent pleural effusion, occurring in 3 patients (3.3%). Other complications were infrequent and included surgical site infection, pyothorax, anastomotic leak following OA/TOF repair, and post-decortication re-intervention requiring chest tube reinsertion, each occurring in 1 patient (1.1%).

Table 4: Postoperative Complications (n = 91)

Complication	Number of Cases (n)	Percentage (%)
Surgical site infection	1	1.1
Pyeothorax	1	1.1
Anastomotic leak (EA/TEF)	1	1.1
Surgical empyema/effusion	3	3.3
Post-decortication re-intervention (re-insertion of a chest tube)	1	1.1
No complications	84	93.3

Table 5 shows, at 3-month follow-up, the majority of patients showed favorable outcomes. Complete recovery, defined as being asymptomatic, was achieved in 83 patients (91.2%).A small proportion, 5 patients (5.5%), had mild residual symptoms, such as persistent cough or exertional dyspnea. There were 3 deaths (3.3%) recorded during the study period.

Table 5: 3-Month Follow-Up Outcomes (n = 91)

Outcome	Number of Patients (n)	Percentage (%)
Complete recovery (asymptomatic)	83	91.2
Mild residual symptoms (cough/exertional dyspnea)	5	5.5
Death	3	3.3

Table 6 Summary of diagnosis and surgical techniques:

Condition		Side	Procedure	Number of Cases (n)
Pleural Effusion/Pneumothorax/ Empyema Thoracis (29)		Right	Chest Drain(29)	19
		Left		10
Encysted pleural Effusion (11)		Right(8)	VATS	2
			Open decortication (35)	6
		Left(2)		2
		Bilateral(1)		1
Empyema Thoracis(26)		Right		18
		Left		8
Lung Abscess with Empyema Thoracis(5)		Right	Decortication with wedge resection(5)	4
		Left		1
Collapse consolidation (Destroyed Lung)(1)		Left	Pneumonectomy(1)	1
Esophageal atresia (9)	without fistula		Gastrostomy + Oesophagostomy	1
	With TOF		Primary repair	8
Congenital Lobar Emphysema (6)		Right(5)	Upper lobectomy	1
			Middle lobectomy	4
		Left	Middle lobectomy	1
Congenital Cystic Adenomatoid Malformation (CCAM) (1)		Left	Segmental wedge resection	1
Foreign Body (lt. Bronchus)(1)		Left	Thoracotomy + bronchotomy & removal	1
Anterior thoracic meningocele(1)		Right	Excision & repair	1
Mediastinalteratoma (1)		Right	Excision	1

Discussion:

This study shows, over 70% of pediatric thoracic surgery cases were mainly due to infectious thoracic diseases. This is in line with recent research from developing countries, where empyema thoraciscontinuesto be a major clinical issue.[3,5]

The high number of open decortication reflects delayed referral, late presentation and advanced disease stage. Previous literature indicates that early-stage empyema can often be managed with chest drainage and fibrinolytic therapy, thereby reducing the need for surgery.6 However, in late-stage disease, open decortication remains the definitive treatment.[4]

The limited use of VATS in this study highlights challenges in resource availability and late referral. Similar trends have been reported in recent multicenter surveys, where variability in practice and limited access to minimally invasive techniques were noted.[3]

The clinical profile, dominated by fever and respiratory distress, aligns with previous studies describing the typical presentation of pediatric empyema.5The postoperative complication rate in this study was relatively low and comparable to published reports. Infectious complications and pulmonary issues remain the most common postoperative concerns.4The mortality rate of 3.3% is consistent with other recent previous studies, where mortality is primarily associated with severe infection and sepsis.[6]

At 3-month follow-up, most patients showed favorable outcomes. However, previous longitudinal studies suggest that children with severe empyema may experience persistent respiratory impairment, emphasizing the importance of early and effective management.[7]

Overall, the findings of this study reflect the ongoing challenges in managing pediatric thoracic diseases in resource-limited settings while also displaying acceptable outcomes with current practices.

Conclusion

In these settings,infectious diseasesare major contributors of pediatric thoracic surgery, particularly empyema thoracis, due to delayed presentation, and inadequate logistics open surgical procedures are still frequently performed. Although Bangladesh Shishu Hospital & Institute has shown encouraging and satisfactory results in pediatric thoracic surgery, to further improve patient outcomes, it is crucial to strengthen early diagnosis, enhance referral systems, and increase access to less invasive procedures.

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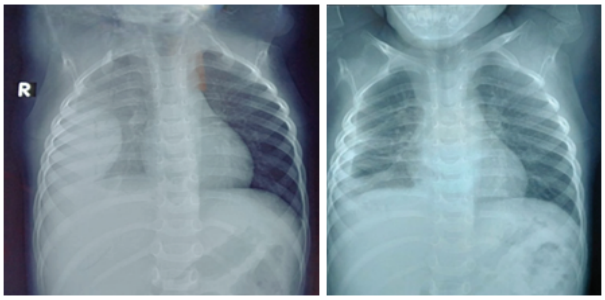


Figure 1 (a) CXR before Decortication (b) after Decortication

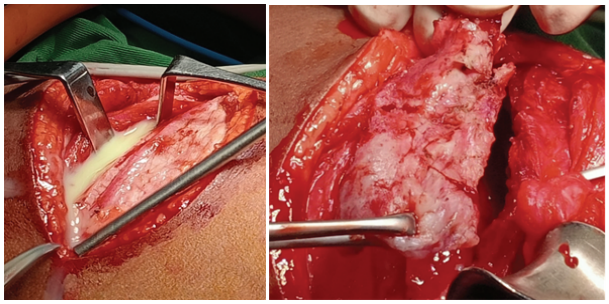


Figure 2: A:Pus in the pleural cavity Figure
B : thickened paraital pleura requiring pleurectomy

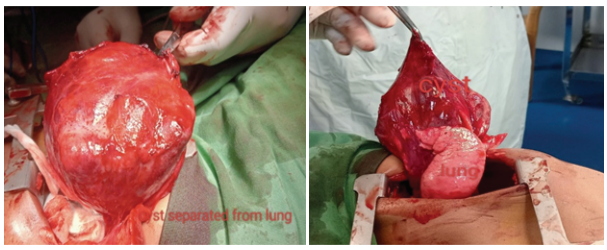


Figure 3: Mediastinal Teratoma (Cystic)

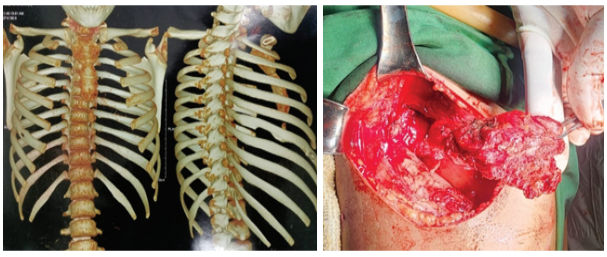


Figure 8: (a) CT scan of Rib lesion (b) Excision of Rib lesion

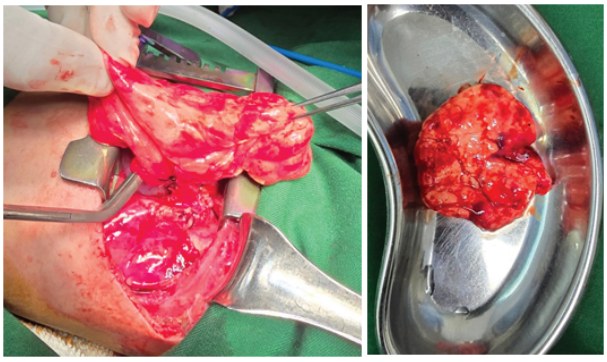


Figure 4 Lobectomy for congenital lobar emphysema

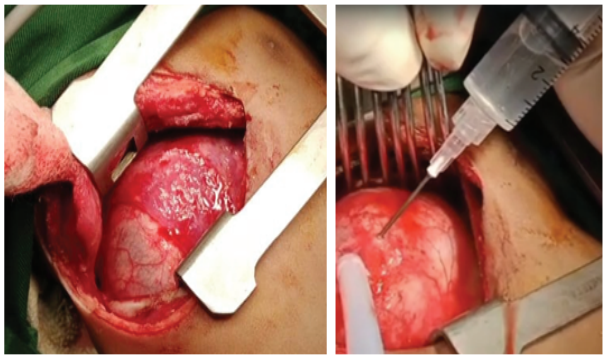


Figure 9: Anterior Meningocele clear fluid(CSF) on aspiraton

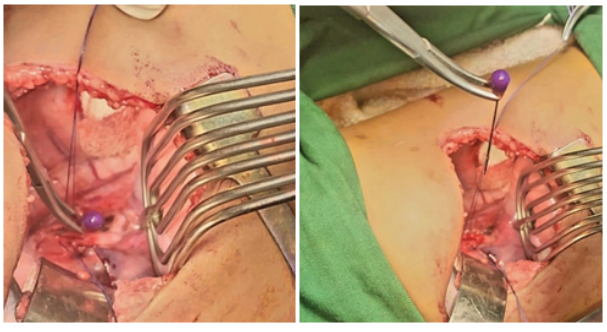


Figure 5: Foreign Body removal

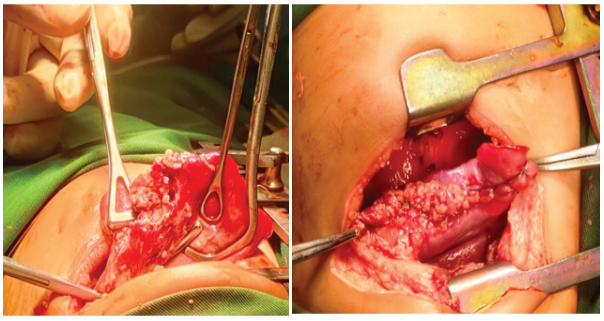


Figure 7: (a)Lung abscess (b)Decortication with wedge resection

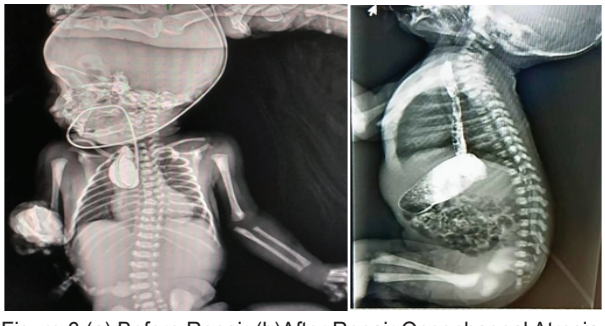


Figure 6 (a) Before Repair (b)After Repair Oesophageal Atresia

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Journal of Paediatric Surgeons of Bangladesh

Case Report

Delayed Presentation of an Ingested Hijab Pin Impacted in the Second Part of the Duodenum: A Case Report

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Mahfuzul Kabir[4], Tanvir Kabir Chowdhury[5]

Abstract

Foreign body ingestion is common in children; however, ingestion of sharp objects such as hijab pins poses a significant risk of gastrointestinal complications. We report a case of a 7-year-old female who presented with delayed referral after ingestion of a hijab pin. Serial radiographs demonstrated persistent localization of the foreign body, ultimately requiring surgical intervention. The foreign body was found impacted in the second part of the duodenum and was successfully removed by enterotomy. This case highlights the importance of early referral and timely intervention in sharp foreign body ingestion.

Keywords

Foreign body ingestion, Hijab pin, Duodenum, Pediatric surgery, Exploratory laparotomy

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Introduction

Foreign body ingestion is a frequent pediatric emergency, especially among children aged 6 months to 10 years.1 Sharp foreign bodies, including pins and needles, are associated with higher risks of impaction, perforation, and migration. Although coins are the most frequently ingested foreign bodies; hijab pin ingestion has been increasingly reported in Muslim communities due to cultural practices.2 Management depends on the type, location, duration, and symptoms. We present a case of delayed presentation of a hijab pin lodged in the duodenum requiring surgical removal.

Case Report

A 7-year-old female child, hailing from Teknaf, Cox's Bazar, was admitted to Chittagong Medical College Hospital (CMCH) on 25 January 2026 with a history of ingestion of a foreign body (hijab pin) 13 days prior to admission. Following ingestion, the patient's mother initially consulted a local hospital where conservative management was advised. An abdominal X-ray revealed a foreign body. The family opted for conservative treatment with laxatives. After 5–6 days, a repeat abdominal X-ray still demonstrated persistence of the foreign body. The patient was subsequently referred to Cox's Bazar Sadar Hospital, where she was admitted for 2–3 days and managed conservatively

again. Due to failure of progression, she was finally referred to CMCH. The patient had no history of abdominal pain, fever, vomiting, hematemesis, or per-rectal bleeding. General examination revealed normal findings. Abdomen was soft and non-tender. Serial plain X-rays of the abdomen were performed. A linear radiopaque foreign body was persistently visualized in the right paravertebral region at the L2–L3 level, with no distal migration over time (Figure 1). The clinical decision was that it was impacted in the small gut or outside the gut. So exploratory laparotomy was performed on 28 January 2026 due to failure of conservative management and risk of complications from the sharp foreign body. Intraoperatively, the foreign body was found impacted in the second part of the duodenum. An enterotomy was performed, and the hijab pin was successfully removed (Figure 2). The procedure was uneventful. The postoperative period was uneventful. The patient was managed with antibiotics, analgesics, and gradual oral feeding. She recovered well and was discharged in stable condition.



Figure 1: Hijab Pin stuck at paravertebral region

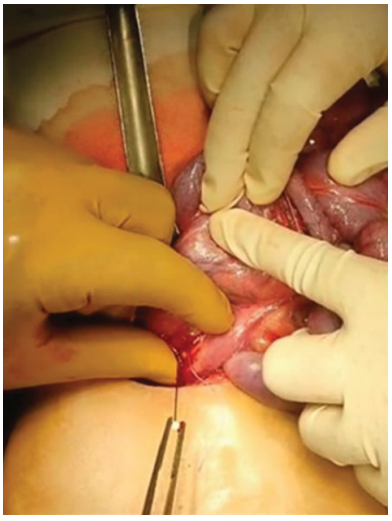


Figure 2: removal of Hijab Pin from duodenum

Discussion

Sharp foreign bodies such as hijab pins carry a higher risk of impaction and perforation compared to blunt objects. Although many ingested foreign bodies pass spontaneously, lack of progression on serial radiographs is a strong indication for intervention.3 Duodenal impaction is uncommon due to its fixed retroperitoneal position but poses a significant risk.4,5 From this case it was retrospectively realized that an endoscopic removal could have been possible if the suspicion of impaction in the duodenum was made.6 Delays in referral and prolonged conservative management increased the risk in this case. Early endoscopic or surgical removal is recommended when sharp foreign bodies fail to progress within 3–5 days or remain stationary.

Conclusion

This case emphasizes the importance of early referral to tertiary care, close radiological follow-up and prompt surgical intervention when conservative management fails. Sharp foreign body ingestion in children should be treated with a high index of suspicion to prevent life-threatening complications. Endoscopic examination can also be considered even after delayed presentation.

Conflict of interest

None

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INFORMATION FOR AUTHOR'S

Aims and editorial process:

Journal of Paediatric Surgeons of Bangladesh (JPSB) is the official journal of Association of Paediatric Surgeons of Bangladesh (APSB) which is recognized by Bangladesh Medical and Dental Council (BMDC) and has International Standard Serial Number (ISSN) 2077-7469 (print), 2309-1320 (online). The journal publishes articles of authors from any part of the globe, but with special interest in articles from authors from Bangladesh. The content includes, but is not limited to, the field of Paediatric Surgery, Paediatric Urology, Paediatric Onco-surgery, Neonatal Surgery, Minimal Invasive Surgery. It publishes editorial, original articles, special articles, review articles, meta-analyses, systematic reviews, case reports and case series through rigorous peer review. A key goal is to promote postgraduate training and further education in all spectrum of Paediatric Surgery.

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