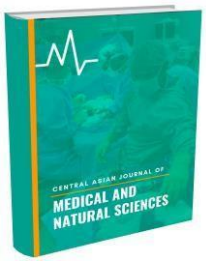

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Article

Lessons from 63 Consecutive Cases in a Developing Country Setting on the Surgical Spectrum of Anorectal Malformations (ARMs)

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Abstract: A vast variety of congenital abnormalities of the distal anus and rectum are referred to as anorectal malformations (ARMs). Neonatal surgery has advanced, but because of delayed diagnosis and a lack of resources, the burden is still high in developing nations. The purpose of this study is to outline the range of ARM types, surgical techniques, and initial results from an Iraqi tertiary facility. All ARM patients treated at a tertiary pediatric surgery unit between January 2016 and March 2024 were retrospectively reviewed. Patient demographics, fistula type, surgical technique, and early postoperative results were among the information gathered. The Krickenbeck classification was used to categorize ARMs by sex. 39 male patients (61.9%) and 24 female patients (38.1%) made up the 63 consecutive patients that were included. The most frequent abnormality in males was rectoperineal fistula (15/39, 38.5%), which was followed by rectobulbar (12/39, 30.8%), rectoprostatic (8/39, 20.5%), imperforate anus without fistula (3/39, 7.7%), and rectobladder neck fistula (1/39, 2.5%). Rectovestibular fistula was the most common in females (12/24, 50%), followed by rectoperineal (9/24, 37.5%), cloaca (2/24, 8.3%), and imperforate anus without fistula (1/24, 4.2%). While high and intermediate lesions were repaired in stages using colostomy and posterior sagittal anorectoplasty (PSARP), the majority of low lesions were treated with perineal anoplasty. Eleven patients (17.5%) experienced early postoperative complications, mainly mild anal stenosis and wound infection. There was no perioperative death. The prevalence of low and intermediate ARMs in Iraqi children is highlighted in this study, which also emphasizes how crucial early diagnosis, referral, and suitable staging are to positive results. Increasing the capacity of neonatal surgical services in developing nations is still essential to achieving better long-term outcomes.

Keywords: Posterior Sagittal Anorectoplasty, Anorectal Malformation, Imperforate Anus, Pediatric Surgical Treatment, Developing International Locations, Iraq

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1. Introduction

A heterogeneous collection of congenital defects involving the distal rectum and anus, anorectal malformations are congenital anomalies associated with pertinent unusual communications with the genitourinary tract or perineum. Anorectal malformations have slight male prevalence. Ar significantly affect 1 in 3,000 to 5,000 live births in India and worldwide [1], [2], [3]. Abnormalities vary from a simple flaw such as a perineal fistula to a single complex one such as a female's cloaca or a rectobladder neck fistula [4], [5]. The management of ARMs is still a significant problem in developing countries owing to a delayed presentation, restricted availability of diagnostics, and specialists and inadequate postoperative completion, despite significant progress in the field of neonatal and

pediatric surgery [6], [7], [8]. The manifestations in these environments could significantly differ from those seen in affluent nations, with numerous children arriving post-complications due to prior futile treatments or beyond the neonatal phase [9], [10], [11]. The anatomical classification of ARMs is critical for prognostication and surgical planning. The most commonly used classification system is the Krickenbeck classification, which categorizes ARMs based on the type of fistula and the level of the rectal pouch [12]. Rectoperineal, rectobulbar, and rectoprostatic fistulae are the most prevalent types in males, whereas rectovestibular and rectoperineal fistulae are more common in females [13], [14]. Rare abnormalities that pose difficult surgical and diagnostic problems include imperforate anus without fistula and cloacal malformations [15], [16].

Neonatal referral pathways are frequently delayed in resource-constrained environments, like Iraq, because of logistical issues and a lack of awareness [17]. Since some patients present weeks or even months after birth, the management of ARMs frequently takes place outside of the neonatal period. Sepsis, intestinal blockage, urinary tract infections, and perineal excoriation are among the complications that may result from this delay [18], [19].

Prior reports from nearby regions, including North Africa, India, and Pakistan, have reported varying frequencies of high fistulae but a preponderance of low lesions [20], [21], [23]. Regional data from Iraq is still scarce, though, and there are few published series that describe the local spectrum and results.

According to this study, 63 patients in Iraq received treatment for ARMs over the course of eight years. The study's goals were to: (1) characterize the sex-specific distribution of ARM subtypes; (2) describe the surgical techniques and initial results; and (3) extract knowledge that could be used to enhance pediatric surgical care in comparable developing-nation settings.

2. Materials and Methods

Study Design and Setting

This was a retrospective descriptive study conducted at a tertiary pediatric surgery center in Iraq, which serves as a national referral hospital for congenital anomalies. The study period was from **January 2016 to March 2024**. Ethical approval was obtained from the institutional review board.

Inclusion Criteria

All children diagnosed with anorectal malformations (imperforate anus with or without fistula) who underwent surgical correction during the study period were included.

Exclusion Criteria

Patients with incomplete medical records, prior surgery elsewhere without documentation, or death before definitive diagnosis were excluded.

Data Collection

Patient records were reviewed for:

1. Age and sex
2. Type of ARM (as per Krickenbeck classification)
3. Presence and site of fistula
4. Type of surgery performed
5. Early postoperative complications

Classification of Anomalies

Lesions were classified as:

1. **Low:** Rectoperineal fistula, rectovestibular fistula
2. **Intermediate:** Rectobulbar
3. **High:** Rectoprostatic, rectobladderneck fistula, and cloacal anomalies

Surgical Management

Low lesions were treated by **perineal anoplasty** under general anesthesia without colostomy.

Intermediate and high lesions were managed in two or three stages:

1. Initial **diverting divided descending colostomy** with skin bridge between the two stomas as shown in fig.1.

Figure 1. Diverting divided descending colostomy

2. **Definitive repair** by posterior sagittal anorectoplasty (PSARP) preceeded by high-pressure distal colostogram in males or posterior sagittal anorectourethrovaginoplasty (PSARUVP) as shown in fig.2-4

Figure 2

Figure 3

Figure 4
Figures 2-4. Definitive repair procedures

Colostomy closure after 6–8 weeks.

Data Analysis

Data were summarized using descriptive statistics. Categorical variables were presented as frequencies and percentages.

3. Results

Patient Demographics

A total of **63 patients** were included: **39 males (61.9%)** and **24 females (38.1%)**. The age at presentation ranged from **1 day to 18 months**, with a mean of **4.2 months**. Most patients (58%) presented after the neonatal period.

Distribution of Anorectal Malformations

Table 1. Distribution of ARM types in male patients (n = 39)

Type of ARM (Male)	Number	Percentage (%)
Rectoperineal fistula	15	38.5
Rectobulbar fistula	12	30.8
Rectoprostatic fistula	8	20.5
Imperforate anus without fistula	3	7.7
Rectobladderneck fistula	1	2.5
Total	39	100

Table 2. Distribution of ARM types in female patients (n = 24)

Type of ARM (Female)	Number	Percentage (%)
Rectovestibular fistula	12	50.0
Rectoperineal fistula	9	37.5
Cloaca	2	8.3
Imperforate anus without fistula	1	4.2
Total	24	100

Surgical Management and Outcomes

1. Low lesions (n = 24) underwent single-stage perineal anoplasty.
2. **Intermediate/high lesions (n = 39)** required staged repair: initial **colostomy**, followed by **PSARP**, and subsequent **colostomy closure**.
3. **Complications** occurred in 11 patients (17.5%):
4. Wound infection (6 cases, 9.5%)
5. Anal stenosis (3 cases, 4.8%)
6. Mucosal prolapse (2 cases, 3.2%)

No perioperative deaths occurred.

4. Discussion

This study presents one of the largest recent series on anorectal malformations from Iraq, reflecting the spectrum and surgical outcomes in a developing country context. The 1.6:1 male-to-female ratio is consistent with worldwide patterns [1], [4], [6]. Other regional studies [14], [17], [20] reported similar findings regarding the prevalence of rectoperineal and rectovestibular fistulae, indicating that low and intermediate lesions account for most ARM cases in this region.

Delays were a major issue, consistent with findings from other developing countries; over half of the patients presented beyond the neonatal period [9], [11], [21]. This delay results from several factors including limited access to pediatric surgical care, home deliveries, and unawareness of congenital anomalies [18], [19]. Early detection and referral are crucial for reducing morbidity and improving outcomes.

The overall complication rate (17.5%) was comparable to that reported in other countries [26], [27]. Wound infection and anal stenosis were the most common complications, often resulting from inadequate postoperative dilatation and hygienic measures [28]. With no deaths and very little resources available, safe surgical technique was demonstrated.

As can be seen in Global trends, over 97.5% of males do not have a rectobladderneck fistula while over 91.7% of females do not have a cloacal malformation [15], [28]. Safe procedures for such complex anomalies require preoperative imaging and multidisciplinary treatment that are not feasible in low-resource settings [22], [24]. However, cooperation with hospitals in neighboring countries and training initiatives can substantially improve our surgical and diagnostic skills Pottel et al., 2015 [19], [25]. The second crucial lesson from our experience is the necessity for standardized procedures such as the Krickenbeck classification [12] that help in enhancing reporting and cross-center comparison. Last but not least, PSARP remains the standard technique for the definitive repair of high ARMs, ensuring both functional and not bad anatomical outcomes Hai-Tao et al., 2016; Feng, 2017; et alamentals et al., 2017 [23], [24], [30]. Nevertheless, continued monitoring is needed for long-term functional outcomes (constipation, continence), which still need improvement in Iraq and comparable situations.

5. Conclusion

The maximum not unusual varieties of anorectal malformations in Iraq are rectoperineal and rectovestibular fistulae, which are low and intermediate lesions. Adherence to nicely-established surgical concepts and cautious postoperative care can bring about favorable early results even with restricted assets. Optimizing consequences for children with ARMs in growing countries calls for strengthening neonatal referral structures, increasing pediatric surgical education, and enhancing postoperative follow-up.

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