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Case Report

Balloon Anal Dilatation: An Alternative Technique for Children with Anorectal Malformation

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Abstract

Introduction: Regular anal dilatations are commonly practiced following posterior sagittal anorectoplasty (PSARP) in the management of anorectal malformation (ARM). This is necessary to maintain anal patency till stoma closure is achieved. Here, we present an index case of a failed PSARP due to difficult anal dilatation and to describe an alternative technique for anal dilatation.

Case Presentation: A 4-year-old male child required re-do PSARP following a failed repair due to a false anorectal passage as a result of faulty anal dilatation. Following a redo PSARP, patient started on regular balloon anal dilatation (BADi). The technique was convenient to parents, acceptable to the child and provided a satisfactory result.

Conclusion: Balloon anal dilatation (BADi) following anorectolplasty for ARM can be a safe and effective alternative to conventional anal dilatation.

Keywords: Anorectal Malformations; PSARP; Anorectoplasty; Anal Dilatation; Balloon Dilatation

Abbreviations

ARM: Anorectal Malformation; PSARP: Posterior Sagittal Anorectoplasty; BADi: Balloon Anal Dilatation; LBW: Low Birthweight; ASD: Atrial Septal Defect; PDA: Patent Ductus Arteriosus

Introduction

Anal dilatation following anorectoplasty for anorectal malformations is a routine practice using different protocols [1]. It is a necessity to maintain anorectal patency till stoma is closed [2-4]. The procedure is usually performed by the surgical staff initially under GA or in the outpatient clinic before it is eventually carried out by the parents at home.

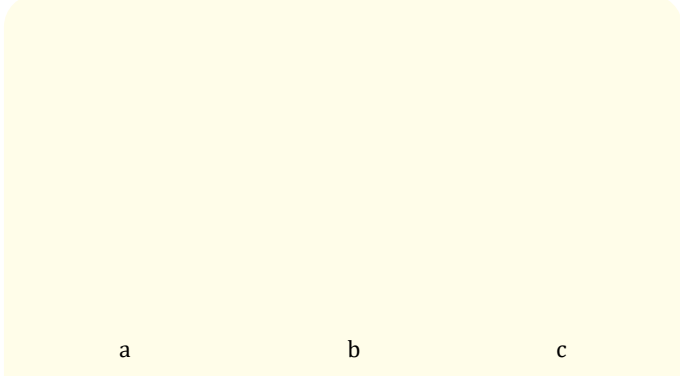
Sometimes, parents may find it extremely difficult to perform the procedure because of fear to cause damage or lack of either dilators, confidence or interest. Children may not be cooperative and resist restraining for anal dilatation. Occasionally, physical injury might occur as a result of forceful anal dilatation and may precipitate a psychological trauma to the child [5]. Reoperations in anorectal malformations may be required as a result of failure of previous repair [3]. Here, we describe a novel technique for anal dilatation following a reoperation anorectoplasty for a failed repair. The concept of this technique was generated from use of a ballooned Foley catheter instead of rigid dilators to avoid repetition of a stressful experience of a patient and his parents following traumatic forceful anal dilatation.

Index Case

A 4-year-old boy (Ex-preterm born at 30 weeks-gestation, LBW 1.5kg) was a known case of small ASD, PDA, duodenal atresia and a high type anorectal malformation (ARM). He underwent duodeno-duodenostomy and staged repair of ARM in infancy. Following an initial divided sigmoid colostomy, posterior sagittal anorectoplasty (PSARP) was performed at the age of 7 months. Conventional anal

dilatation using Hegar's dilators was commenced 2 weeks postoperatively, initially under GA. Parents were instructed and taught to continue to perform regular anal dilatation at home. Stoma was closed 4 months later following an unremarkable distal loopogram study immediately prior to closure of stoma. Unfortunately, a false posterior tract of a recto-cutaneous fistula was being created accidently due to inadvertent faulty anal dilatation at home as the patient was very irritable and non-compliant. As a result, the child had a diversion colostomy at the age of 13 months.

A re-do, combined abdominal-PSARP with removal of a false tract was conducted at age 4 (Figure 1 and 2). Anal dilatation was commenced under GA on day 14 and 21 postoperatively. Thereafter, and as the child was very reluctant to undergo anal dilatation while awake, the procedure was carried out under sedation every other day as an inpatient, a situation which was inconvenient for the family. An alternative technique of dilatation using ballooned catheter was used. Informed consent was obtained and parents demonstrated adequate performance of balloon anal dilatation while in hospital and, with convenience, at home. Parents also reported that the child gradually accepted this modality and became more cooperative.



a b c

Figure 1: a. Re-do PSARP Intraoperative photo showing the posterior passage grasped by forceps (Arrow). b. Folded rectum slinged with abnormal artificial posterior tube and a neo-rectum (Arrow). c. Longitudinally incised rectum following release of the posterior false passage and straightening of the artificially "folded" neo-rectum. Note the neo-anal opening in the lower end of the open rectum at its junction with the straightened and open, rudimentary fistulous tract.

Technique used for balloon anal dilatation:

A well lubricated size 18 Catheter was advanced into the neo-rectum, balloon filled with water at room temperature to the required volume (Figure 3a-3f). Applying a firm and sustained traction, the catheter was pulled out gently and slowly allowing the balloon to stretch the anal canal until the desired anal dilatation was achieved. Dilatation was stepped up over several weeks by gradually increasing the water volume in the balloon according to a time schedule. The procedure could be repeated in the same session, at different times during the day or once daily.

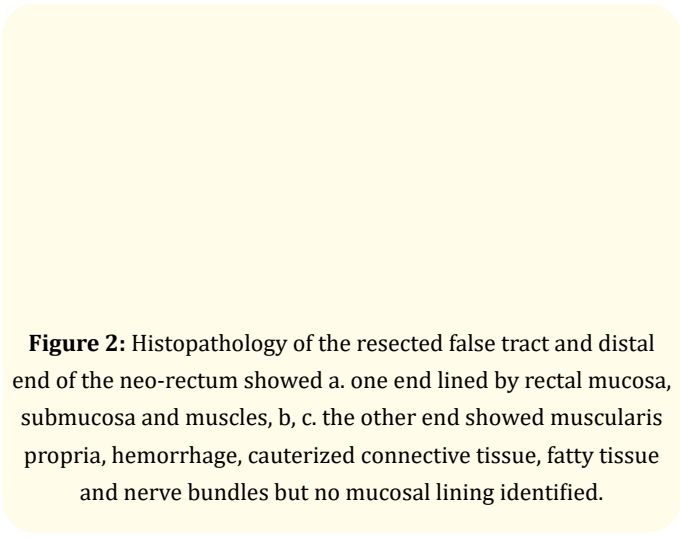


Figure 2: Histopathology of the resected false tract and distal end of the neo-rectum showed a. one end lined by rectal mucosa, submucosa and muscles, b, c. the other end showed muscularis propria, hemorrhage, cauterized connective tissue, fatty tissue and nerve bundles but no mucosal lining identified.

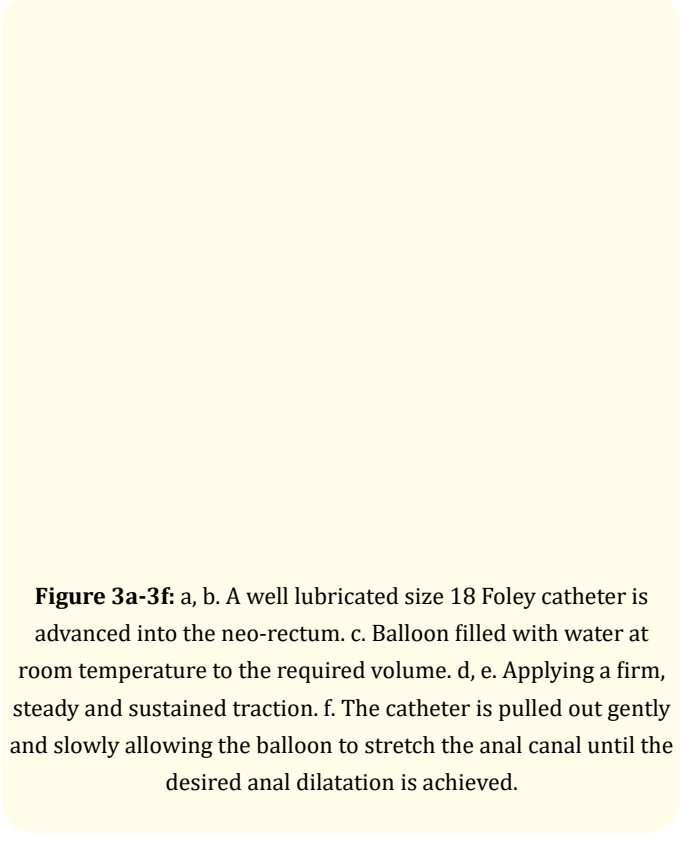


Figure 3a-3f: a, b. A well lubricated size 18 Foley catheter is advanced into the neo-rectum. c. Balloon filled with water at room temperature to the required volume. d, e. Applying a firm, steady and sustained traction. f. The catheter is pulled out gently and slowly allowing the balloon to stretch the anal canal until the desired anal dilatation is achieved.

The elastic and molding nature of the catheter allows gradual sliding of the well lubricated, water filled balloon through the neo-anal canal and orifice under gentle but firm, sustained and steady traction until easy dilatation with that size is obtained. The procedure is repeated with 1/5 - ½ cc gradual balloon volume increment at few days' intervals until desired level of dilatation is eventually achieved before stoma closure. Sizes have been checked against sequential Hegar's dilators and matching was determined (Figure 4 and table 1).

Figure 4: Foley catheter in comparison with a set of Hegar's dilators a. Size 18 Fr catheter measurement with an empty balloon is equivalent to size 6 Hegar's dilator b. Size 18 Fr Foley catheter with a water filled balloon. Balloon measurement varies with the filling volume and is estimated to be equivalent to size 15 Hegar's dilator when filled with 3cc on this illustration.

Latex Foley Catheter Size (Fr)	Balloon inflation Volume (cc)	Equivalent Hegar's Dilator Size	Circumference (cm)
18	0.0	6	1.85
18	1.4	7	2.3-2.4
18	1.6	8	2.6-2.7
18	1.8	9	2.9-3.0
18	2.0	10	3.2
18	2.2	11	3.5
18	2.4	12	3.8
18	2.6	13	4.2
18	2.8	14	4.5
18	3.0	15	4.8
18	3.2	16	5.0
18	3.4	17	5.3
18	3.6	18	5.6

Table 1: Estimated different sizes of a ballooned catheter measurements by volume of inflation in comparison with sequential Hegar's dilators.

Discussion

Anal dilatations are a necessary part of the postoperative management to avoid a stricture at the anoplasty [4]. There is, however, rare but potential risk to daily dilatations by parents, including inadvertent disruption or perforation of the anastomosis [5]. In fact, both children and parents usually dislike the procedure which can be very stressful for them, in addition to the genuine concerns about the psychological stress and its negative impact on both parent and child. This adverse psychological effect has been proven by studies, particularly in older children [5]. Other studies questioned the clinical benefits from the practice of routine daily anal dilatation, and to avoid such unpleasant negative effects, they advocate weekly dilatation or non-dilatation as viable alternatives [5,6].

Overall, although the practice of regular anal dilatation is justifiable and beneficial in preventing anastomotic stricture, there is no doubt that parents and children experience stress from conventional rigid anal dilatations. The technique of BADi described here comes as a balance between the negative effects of the routine conventional dilatation, and the potential risk of stricture associated with elimination of regular anal dilatation.

Various tools for anal dilatation following anorectoplasty for ARM are in use [1]. These include conventional rigid dilators of different makes (such as Hegar's) and anecdotal use of crafted, tapered pieces of soap or candles. They share the principles of being rather rigid, tapered, blunt, smooth, and used transanally in a retrograde direction.

The technique of balloon anal dilatation is easy to learn and perform. The dilating object is soft, gentle and less traumatic to the sensitive anal area. The molding nature of the balloon makes it adaptable and associated with less pain and discomfort to the child when used, thus buffering the effect of the force exerted in the process by the operator. It is therefore well tolerated and is attended with better compliance both by patient and parents, as shown in the case report. Besides, the antegrade direction of anal dilatation makes it more physiological. Such balloon catheters are available and less costly.

The use of ballooned Foley catheter in extra-urinary emergency and elective procedures in children, particularly in GIT, have been described. Examples of such uses include:

- Hydrostatic or pneumatic reduction of intussusception under imaging (fluoroscopy or US), where occasionally it was noticed that the catheter with inflated balloon was readily expelled through the anus due to non-well tightly strapped buttocks, under the effect of insufflation pressure in the colorectal loop and patient's straining [7].

- Foley catheters have been used for removal of radiopaque objects such as coins [8,9]. However, extraction of esophageal impaction of foreign bodies using this technique is controversial, for fear of aspiration.

- Esophageal elongation in long gap esophageal atresia has been described recently using Foley catheters instead of Foker process sutures [10].

- Fluoroscopically guided balloon dilatation, using a specially designated dilatation balloon catheter, is an established primary method of treating benign pediatric esophageal strictures [11].

In elective procedures, Foley catheters have been used:

- As temporary gastrostomy [12-14], jejunostomy [15] tube in absence of proper G tube and button.

- In conducting pressure distal colostogram in ARM to ensure integrity and patency of distal loop prior to stoma reversal [16].

- For high output stoma to allow refeeding of stoma losses into the distal stoma [17].

- For plugging a proximal jejunostomy in preparation for bowel lengthening in short bowel syndrome [18,19].

These are few examples of beneficial use of ballooned or Foley catheters in pediatric GIT procedures and most of them stood the test of time. Balloon anal dilatation has been reported to be used for chronic anal fissure in adults [20]. To the best of our knowledge balloon anal dilatation following anorectal surgery has not been reported in children. The technique can be an addition to the above mentioned uses as it has the following advantages: Availability of ballooned catheter and in various sizes, less costly, blunt, smooth, soft, flexible, gentle on tissues, simple to use, easy to learn and apply, reusable with easily achievable dilatation adjustments and upgrading, safe, provide a more physiological antegrade dilatation with the lumpy/mass nature of the filled balloon mimicking a fecal mass, and, in older children, a patient can be trained to strain to defecate. Occasionally, catheter can be left in situ with filled balloon to exert a sustained stretching of the anal canal. It is well tolerated by a child and acceptable to parents, with less risk of damage or creation of false passage, less pain with less discomfort, and resulted in better patient and parental compliance and outcome.

Filled balloon, though compressible acquires a degree of tension adequate enough to enable it to exert substantial effective dilatation. Certainly one needs to reach a higher level on balloon dilatation to achieve a desired equivalent level of Hegar's dilatation, but this is not a real concern as progressively increasing dilatation is carried out using the balloon dilator at its own scale.

The procedure of balloon anal dilatation should be carried out carefully as neo-rectal diameter is predicted to be relatively small compared to normal rectum owing to colonic diameter as well as transient disuse narrowing. Therefore, it is necessary to avoid excessive anorectal stretching due to balloon over distension. Parents should be thoroughly educated about the technique to avoid complications such as anorectal tear that might arise due to either balloon over distension or abrupt forceful pulling of the catheter.

It is also recommended to undertake prospective and randomized clinical trials comparing conventional anal dilatation with the balloon anal dilatation to evaluate and assess the validity and efficacy of the technique.

Conclusion

Balloon anal dilatation (BADi) following anorectoplasty for anorectal malformation appears simple, safe, effective and was well tolerated by a child. Further randomised controlled trial studies are required to evaluate its efficacy. Parents undertaking this method should be thoroughly educated about the technique to avoid potential complications.

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