Original Article

The Candle as an Improvised Anal Dilator Following Surgery for Anorectal Malformation

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Abstract

Introduction: Anal dilation with Hegar dilator is recommended as part of the post-operative management following surgical correction of anorectal malformation (ARM) in children to prevent strictures. Parents usually continue dilation at home with a personal set of dilators. However, in low-resource settings, many parents cannot afford the Hegar dilator. Devices that have been improvised as dilators include appropriately sized candles, spigot from Foley catheter, rounded ball pen ends and mothers' fingers. We aimed to report our preliminary experience with the use of candle as an improvised anal dilator following surgeries for ARM in our practice. **Materials and Methods:** A review of records of children who had surgery for ARMs and commenced on candle dilation between February 2018 and July 2019 at our centre was done. Relevant demographic information, type of anomaly, duration of dilation, availability of health insurance coverage, complications and parents' acceptance of improvised dilator (evaluated during scheduled follow up visits) were retrieved. The data were analysed using SPPSS version 21 (Chicago, Illinois). **Results:** Nineteen patients underwent anal dilation with improvised candles during the period. Rectobulbar and rectovestibular fistulas were most frequent anomaly in boys and girls, respectively. The median age at surgery was 6 months. The median duration of dilation (completed in 9 patients) was 7 months. Candle dilation was well tolerated, and all parents were comfortable using the device. **Conclusion:** The candle as an improvised anal dilator following anorectal surgeries in children is a useful alternative to the conventional dilator. It is more affordable and gives satisfactory results.

Keywords: Anorectal malformation, Hegar dilator, improvised candle dilator, posterior sagittal anorectoplasty

Introduction

Anal dilation with Hegar dilator is usually recommended as part of the post-operative management following surgical correction of anorectal malformations (ARM) to prevent the development of strictures. Dilation is initiated in the hospital by the surgeons and parents usually continue dilation at home with a personal set of Hegar dilators.[1-3] However, in resource-limited regions, where metallic dilators (and its plastic variant) may be unaffordable, some devices have been improvised as alternatives to Hegar dilators. This includes the use of appropriately sized candles, spigots from Foley catheters, rounded ball pen ends and the mother/guardian's fingers.[4-7] In our practice, procuring Hegar dilator is a challenge and the mothers' fingers we commonly resort to also has its problems due to size variability and difficulty in appropriately calibrating to the desired Hegar size. Hence, we sought to explore a similar alternative to the standard Hegar dilators. We aimed to document our initial experience with the use of wax candles as an improvised anal dilator following surgical repair of ARM in children managed in our centre.

Materials and Methods

A review of records of children who had surgery for ARM and were commenced on dilation using improvised cylindrical wax candle from February 2018 to July 2019 was done. Ethical approval for the study was obtained from the hospital's health research ethics committee (approval number FMCY/HREC/20/93). Demographic information,

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type of anomaly, age at surgery, duration of dilation (for those completed within the study period), availability of healthcare insurance coverage for the cost of care, problems encountered with dilation and parental satisfaction with transitioning from hospital-based Hegar dilator to improvised candles (evaluated during scheduled follow up visits using a 5-point Likert scale questionnaire) were entered into a structured pro forma. Relevant data were analysed using SPSS version 21 (Chicago, Illinois, USA), and the results were presented as frequencies, percentages, means, median, tables and charts.

In our hospital, anal dilation was usually commenced from the 14th post-operative day using the hospital's set of metallic Hegar dilator, starting with the size that snugly fits. The dilation was then continued with the improvised candle. The candles were the commercially available, white, cylindrical pack-of-eight paraffin wax stick candles used domestically to provide lighting in some households (Aoyinbrand sky light candle®). We utilised candle sizes with diameters of 12 mm to 15 mm. The wick at the top of the candle was cut off and the tip is shaped and smoothened (using a razor blade or scalpel blade) into the required Hegar dilator size by the surgeons and handed over to parents [Figure 1]. Caregivers were then taught how to perform twice daily dilations at home using the well lubricated, improvised cylindrical wax candles shaped and smoothened to the appropriate size (comparable to the desired Hegar dilator size; Figure 1), increasing weekly until the desired anal size for age is reached. After each use, the candle was washed, dried and kept in a clean container/ cellophane bag. The rest of the dilatation was usually done per the Pena protocol.[2] If the candle partly breaks during the course of the dilation schedule, the dilating end is cut off and the residual end reshaped to the desired size for continued usage. If the candle length becomes too short following repeated use, a new one is picked.

Results

Twenty-four patients underwent surgery for ARMs within the period. Out of these, 19 patients (12 males, 7 females, M:F 1.7:1) had improvised candle dilation following surgery and were included in the analysis. Four patients who had digital dilation with mothers' fingers and one patient that required a redo surgery were excluded.

Rectobulbar urethral and rectovestibular fistulas were the most common anomaly in males and females, respectively [Table 1].

The median age at anorectoplasty was 6 months [range, 9 days to 36 months; Table 2].Ten patients (52.6%) had surgery between the ages of 3 and 6 months [Table 3].

None of the patients were enrolled under the National Health Insurance Scheme (NHIS), and the cost of surgery and other expenses was borne by parents.

Anal dilation was commenced from the 14th post-operative day onwards in 14 patients (median of 15th post-operative day; Table 4). Dilation was initially delayed (defined as dilation commenced on or beyond the 21st post-operative day) in three patients due to minor wound dehiscence but was started after the wound had healed (at 3 weeks in one patient, 4 weeks in two patients). Delay in commencement also occurred in two other patients who defaulted follow-up and later presented with anal stenosis more than 2 months after surgery.

Some problems were reported with the use of the candle. Two mothers reported slight bleeding and occasional discomfort

Table 1: Types of anorectal malformation

Types of anorectal anomaly	Number of patients (%)
Perineal fistula	2 (10.5)
Rectovestibular fistula	7 (36.8)
Rectobulbar fistula	7 (36.8)
Rectoprostatic fistula	3 (15.8)
Total	19 (100.0)

Table 2: Age of patients at surgery

Age of patients	Number of patients (%)
9 days	1 (5.3)
6 weeks	1 (5.3)
4 months	3 (15.8)
5 months	4 (21.1)
6 months	3 (15.8)
7 months	3 (15.8)
9 months	1 (5.3)
10 months	1 (5.3)
24 months	1 (5.3)
36 months	1 (5.3)
Total	19 (100.0)

Table 3: Age distribution of patients at time of surgery

Age group	Number of patients (%)
0-3 months	2 (10.5)
3-6 months	10 (52.6)
6 months-1 year	5 (26.3)
1-3 years	2 (10.5)
Total	19 (100)

Table 4: Post-operative day dilation commenced

Post-operative day	Number of patients (%)
14	9 (47.4)
15	2 (10.5)
16	1 (5.3)
17	1 (5.3)
18	1 (5.3)
21	1 (5.3)
28	1 (5.3)
30	1 (5.3)
72	1 (5.3)
75	1 (5.3)
Total	19 (100)

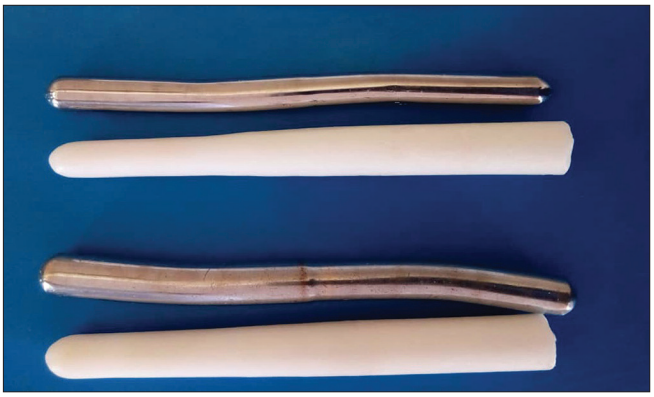


Figure 1: Shaped candles with corresponding Hegar dilators

during the initial period (1st week) which resolved thereafter. Two mothers also reported that the candle broke partially at the midpoint after repeated use.

Dilation protocol was completed in 9 patients within the study period, and the median duration of dilation was 7 months. All patients achieved and maintained the expected, age-appropriate anal size.

All Mothers/caregivers expressed satisfaction and generally felt comfortable transitioning from the hospital's metallic dilators to using the candle as dilators at home.

Discussion

The practice of anal dilation is an integral part of management following anorectoplasty for ARM to prevent the development of strictures. The Hegar dilator is recommended for this and parents are usually taught how to continue dilation at home.[1,2] In this study, most of our patients were commenced on dilation between the 14th and 18th post-operative day. This is similar to the generally established practice of starting anal dilation at about the 14th post-operative day.[8,9] All of our patients who completed the dilation within the study period achieved and maintained the desired anal calibre within an average of about 7 months, similar to the recommended Pena anal dilation protocol duration.[2,3]

As highlighted in this study, none of the patients were enrolled under the NHIS. Our experience is that most of our patients pay for health services out-of-pocket and they usually struggle to save up money for the surgery. As a result, the majority of parents cannot afford to buy a personal set dilator for use at home because this puts more strain on the already meagre resources at their disposal. A study by Jumbi *et al.* in Kenya reported that most of the parents practice digital anal dilation as it is the cheapest, most available option.[7]A set of Hegar dilator costs between 8,000 and 12,000 Nigerian Naira (about 20–30 US Dollars) in our environment. However, a pack of candles (about 8 pieces) costs less than a dollar (412 Naira), making it more affordable. In Nigeria, poverty is measured using consumption expenditure rather than income. According to recent data from the National Bureau of Statistics, 40.1% of the total population of Nigeria were classified as poor (living on <1 dollar/day) and more than half of household income is spent on food alone.[10].In Adamawa state, northeastern Nigeria where our hospital is located, the poverty head count rate (the percentage of the population living within households where the value of per capita total consumption expenditure is below or equal to the poverty line) is 75.41%, a value that is higher than the average national poverty rate of 40.1% of the total population. Each region and state within the country have different poverty rates,with some regions being higher than others. This is the basis for comparison between the poverty rate in Adamawa state (75.41%) and the national poverty rate of the country (40.1%) as a whole. Similarly, in all the states comprising the northeastern region of Nigeria (excluding Borno state), the poverty head count rate is between 61% and 81% of the total population.[10]

In our practice, we have observed that candle has some advantages that make it suitable for use as a dilator. Like the Hegar, it is a fairly rigid device. It is also very cheap, readily available and can be used multiple times as the ends can be reshaped to the desired size, even if broken. Since only a short length of the candle (4 cm or less) is required to be inserted for dilation, a single candle (averaging 10 cm to 30 cm in length) can be used more than once (for gradual, progressive increments in size) by cutting off the previously tapered, dilating end and reshaping the bigger residual end to the desired size.

The mothers/guardians' finger has been improvised as a dilator and is clearly the cheapest alternative to Hegar dilator.[4,7,11] However, we have observed some limitations to its use in our practice; to create an adequate length to achieve good anal dilation, a good proportion of the terminal phalanx has to be introduced, and the distal interphalangeal joint of the guardian's dilating finger must be in the extended position to provide rigidity. Due to the lack of consensus regarding the recommended standard length of dilator that should be inserted into the anus, there is variability in the length (2–3.8 cm) advocated across different hospital protocols.[12,13] What is clear is the necessity of introducing an adequate length of dilator sufficient enough to go just above the anal sphincter mechanism for effective dilation. However, we noticed that some parents are reluctant to 'stick' in a finger into the child's anus. This reluctance coupled with improper technique can lead to inadequate dilation and subsequent development of anal stenosis. In addition, the study by Jumbi *et al.* highlighted the variability in the mean diameter of the mother's dilating fingers. This led to difficulty in accurately calibrating the digits to the appropriate anal dilator sizes, contributing to an increased risk for anal stricture development.[7]

Dewan *et al.* mentioned the usage of candle dilators following surgery for ARMs in Papua new guinea.[5] Furthermore, a description of how to make homemade dilators from wax candles has been documented.[14] The use of plastic pens as a possible substitute for metallic dilators has also been reported.[6] To the

best of our knowledge, this is the first report to comprehensively describe the utilisation of candles as improvised anal dilators following the surgical correction of ARM.

Limitations of this study include the relatively small number of patients involved and the retrospective nature of the study. We also acknowledge the need for a multi-centre, prospective randomised control trial comparing the use of improvised candles and the standard anal dilators for further validation.

Conclusion

We recommend the improvised candle as useful device for anal dilation post-anorectal surgeries in children, especially in resource-limited settings. It is a cheaper alternative that gives good results and is well accepted by parents.

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Conflicts of interest

There are no conflicts of interest.

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