EFFECT OF COTTON PAD PLACEMENT REINFORCED WITH AN ELASTIC CREPE BANDAGE IN EARLY RESOLUTION OF INFANTILE UMBILICAL HERNIA

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ABSTRACT

Background: Umbilical hernia (UH) in infants is typically identified as a bulge in umbilical region in early couple of months, appearing after the shedding off the umbilical cord. It occurs when a sac lined by peritoneum protrudes from umbilical ring, due to its incomplete closure.[1] This failure of the umbilical ring to close properly contributes to the formation of an umbilical hernia.

Objectives: To evaluate the effectiveness of a conservative approach using a cotton pad reinforced with a crepe bandage (Ammannaya's technique) in promoting the resolution of infantile umbilical hernia.

Methods: This RCT was conducted at The Children's Hospital, Lahore. Ethical approval from institutional review board obtained and trails was also registered to Thai Clinical Trials Registry. A total of 108 infants (≤3 years) with umbilical hernia were enrolled and randomly allocated into an intervention group (cotton pad with crepe bandage) and a control group (observation only), with 54 patients in each arm. Patients were followed at 4 and 8 weeks, and chi-square test was used for comparison of resolution rates.

Results: Of these 108 patients, 65 (60.2%) were male and 43 (39.8%) female, with most infants younger than 6 months (77.8% intervention vs. 87.0% control). At 4 weeks, resolution found in 25.9% of the intervention group whereas occurred in 9.3% of the control group ($p = 0.023$). By 8 weeks, cumulative resolution was found to be higher in the intervention group (59.2%) in comparison with the control group (37.1%) ($p = 0.029$). Closure was more common in infants <6 months, whereas resolution was rare in older infants irrespective of management. No complications were observed with the intervention.

Conclusion: Application of a cotton pad with crepe bandage accelerates and increases the resolution rate of infantile umbilical hernia compared with observation alone. This low-cost, safe, and practical technique may serve as an effective conservative alternative, particularly in resource-limited settings.

Key words: umbilical hernia, conservative treatment, crepe bandage, non-surgical management, observation, infant

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INTRODUCTION

Umbilical hernia (UH) in infants is typically identified as a bulge in umbilical region in early couple of months, appearing after the shedding off the umbilical cord. It occurs when a sac lined by peritoneum protrudes from umbilical ring, due to its incomplete closure.[1] This failure of the umbilical ring to close properly contributes to the formation of an umbilical hernia. UH are of two types direct and indirect; direct type is because of weakened or

absent fascia of umbilical defect while in indirect type herniation of peritoneal contents occurred from the point just above the umbilical ring.[2, 3]

To date Umbilical hernias are generally considered benign, with most parents seeking consultation for cosmetic reasons in addition to pain or complications. However, incidence exceeding 10%, and is particularly common in preterm and low-birth-weight infants.[4]notably, 75% of infants weighing less than 1.5 kg at birth is affected. Most of the infantile umbilical hernias resolve by itself in between ages 3 to 5 years, with over 85% closing by age 6 years.[5, 6]

No consensus guidelines are available to date for UH repair. Many practices are prevalent for age at which repair should be considered. In most cases, observation is recommended, and surgical intervention is considered only for symptomatic hernias or those that fail to close by age 4 to 5 years.[7] Management of symptomatic umbilical hernia (UH) is generally consistent. Strangulated or incarcerated hernias require urgent or semi-elective surgical repair, while treatment decisions for other cases are guided by symptoms, hernia size, parental concern, and cosmetic considerations.[8]

The current standard for management is "watchful waiting" until children reach 4 to 5 years of age afterwards surgery is employed.[8] Though adhesive strapping has been proposed as a treatment option, its use is infrequent due to decreased supporting evidence and some skin complications are also being reported with this technique.[5] While the risk of complications such as strangulation and incarceration necessitates immediate surgical evaluation and operation. Premature surgical treatment for hernias which are likely to resolve on their own, could place unnecessary strain on healthcare systems, as well as impose financial burdens on families, insurers, and society.[8, 9]

The objective was to evaluate a conservative approach using a cotton pad reinforced with a crepe bandage to promote the resolution of infantile umbilical hernia. This method may provide a simple and effective alternative to more invasive surgical procedures.

METHODS

This RCT was conducted in The Children's Hospital, Lahore. Approval was granted by Institutional Review Board Data were collected from May to September 2025. The study protocol was registered with Thai Clinical Trials Registry (Reg No. TCTR20251129003) Informed and written consent was acquired from the legal guardians of all patients.

Criteria for admittance: A total of 108 patients of either gender, aged ≤3 years, with a diagnosis of umbilical hernia and without associated syndromes, were enrolled through a non-probability consecutive sampling technique.

Study Groups and Intervention**:** Patients were randomly allocated into two equal groups using the balloting method (n = 54 in each): an intervention group and a control (observation) group. Baseline assessment of the hernial defect was performed in all patients. Both groups were subsequently followed up and re-evaluated at 4 and 8 weeks.

Intervention: Parents were instructed on the following technique: (i) reduce the hernia contents and palpate the defect when the child was calm, (ii) place a soft cotton pad, rolled into a small ball, over the defect, and (iii) wrap a crepe bandage gently around the abdomen, forming three layers over the reduced umbilicus. The bandage was to be kept on during the day and removed at night, ensuring it was neither too tight nor too loose for the child's comfort. Continue this procedure till hernia gets resolved or 8th weeks are passed, whichever comes earlier. In case of any complication seen, stop this technique.

Statistical Analysis: SPSS version 23.0 was used to analyze the data. Categorical/quantitative variables were presented as frequencies and percentages. Chi-square test was used to analyze these variables keeping p-value <0.05 as significant.

RESULTS

In this study 108 patients were included in which 65 were males (60.2%) and 43 were females (39.8%). The majority of children with umbilical hernia were aged 1–6 months, accounting for 77.8% in the intervention group and 87% in the control group. No significant difference was found in age and gender distribution in mentioned groups. In 57% of cases in the intervention group in comparison to 39% cases in conservative group, the umbilical hernia was resolved in the same period, suggesting a potential benefit of the intervention (p = 0.054). See Table-2.

At 4TH-week follow-up, resolution was seen in 14 out of 54 patients (25.9%) in the intervention group versus 5 out of 54 (9.3%) in the observation group (p = 0.023). By the 8th week, an additional 18 patients (33.3%) in the intervention group (making a total of 59.2%) and 15 patients (27.8%) in the observation group achieved resolution (making total of 37.1%). In the bandage group the proportion of unresolved cases at 8 weeks remained lower (40.7%) while in the observation group more (63.0%) remained unresolved (p = 0.029).

DISCUSSION

Infantile umbilical hernia is a problem that often causes considerable concern for parents and caregivers until it resolves. While the majority of hernias close spontaneously by the age of five years, the timing of resolution can vary, and the factors influencing this variability remain an area of interest. One possible reason

for delayed closure is the persistent gut protrusion through the umbilical defect.[2] In this study, we explored this aspect by maintaining continuous reduction of the hernia using a cotton pad reinforced with a crepe bandage, with the aim of assessing its impact on resolution time across different age groups.

Umbilical hernia usually develops because umbilical ring failed to close, leaving behind a defect through which small bowel commonly protrudes into the umbilicus.[1] It typically resolves over time as the abdominal muscles strengthen and the umbilical ring narrows, preventing further protrusion. The likelihood of spontaneous closure of these hernias is strongly affected by age and the defect size.[11-14]

Table 1: Demography and outcome comparison

		With Cotton Pad & Bandage (n=54)		Without Cotton Pad & Bandage (n=54)		Total (n=108)	P-value
		No. of patients	Resolved	No. of patients	Resolved		
Mean age		1.37 ± 0.8		1.26 ± 0.7			
Age	1–6	42 (77.8%)	29	47 (87.0%)	21	89 (82.4%)	0.021
(months)	6–12	7 (13.0%)	2	3 (5.6%)	0	10 (9.3%)	0.301
	13–24	2 (3.7%)	0	1 (1.9%)	0	3 (2.8%)	
	>24	3 (5.6%)	0	3 (5.6%)	0	6 (5.6%)	
Gender	Male	35 (64.8%)	22	30 (55.6%)	12	65 (60.2%)	0.326
	Female	19 (35.2%)	9	24 (44.4%)	9	43 (39.8%)	
Closure	(Yes)	31 (57.4%)		21 (38.9%)		52 (48.1%)	0.054
	(No)	23 (42.6%)		33 (61.1%)		56 (51.9%)	

Table-2: Outcome comparison

		With Cotton Pad & Bandage (n=54)	Without Cotton Pad & Bandage (n=54)	p-value
Status at 4th week	Resolved	14 (25.9%)	5 (9.3%)	0.023
	Not Resolved	40 (74.1%)	49 (90.7%)	
Status at 8th week	Newly Resolved	18 (33.3%)	15 (27.8%)	0.029
	Not Resolved	22 (40.7%)	34 (63.0%)	
	Total resolved	32 (59.2 %)	20 (37.1%)	

Umbilical hernias mostly resolve on their own within first few couple of years. Smaller defects typically close earlier and larger ones take longer duration. In our study, a statistically significant resolution of umbilical hernia was observed in infants presenting within the first 6 months of life. Most patients were younger i.e. less than 6 months, representing 77.8% (42/54) of the intervention group and 87.0% (47/54) of the control group. Within this age range, 69% (24/42) of the intervention group achieved closure whereas 44% (21/47) of the control group was successful in resolution ($p = 0.021$). In contrast, resolution was uncommon in older infants, with only two cases recorded between 6–12 months and none beyond 12 months, regardless of management strategy. This trend aligns with the natural progression of umbilical hernia, as most defects close within the first two years of life, with sharp decline in spontaneous resolution thereafter. However, findings in infants beyond 6 months should be interpreted with caution, as small numbers of patients were there, to allow meaningful statistical analysis.

The comparison of age groups in our study suggests that early initiation of the intervention may enhance the likelihood of spontaneous resolution during the period when natural closure is most favorable. Conversely, in older children, the diminishing rate of closure indicates that such interventions may be less effective, and surgical repair may ultimately be required.

Our findings support the hypothesis that non-invasive interventions can facilitate closure without complications and reduce parental anxiety associated with persistent umbilical hernia. This approach was first reported by Ganesh Kumar K. Ammannaya, who described the technique now known as “Ammannaya’s technique,” a low-cost method using an elastic crepe bandage.[10]Compared with previously tried methods (binders, taping, adhesive strapping), which are either costly or associated with skin complications, this technique is practical and safe.[10] In multiple studies conducted by Sugimoto et al., Sakuri et al. and Kitano et al. etc, skin complications were observed and we found no such complication in our technique.[15-18]

Limitations of this study include the single center design and small sample size, which limit generalizability. We did not assess the relationship between closure and defect size, and because most patients were under 6 months of age, applicability to older infants remains uncertain. Furthermore, the short follow-up may not

fully capture long-term closure rates or late complications. Future studies should focus on large multicenter trials with extended follow-up to validate these findings and establish standardized recommendations for conservative management of infantile umbilical hernia. Development of uniform protocols for application—including duration, frequency, and technique would help minimize variability in practice.

CONCLUSION

Conservative management of infantile umbilical hernia with a cotton pad and crepe bandage (Ammannaya's technique) resulted in higher closure rates in infants compared with observation alone, without any complications. This method is safe, inexpensive, and practical, particularly in resource limited settings.

ETHICAL APPROVAL

Ethical approval of article was granted by the Institutional Ethical Review Board of the Children Hospital/University of Child Health Sciences vide reference No (No. 1151/CH-UCHS, dated 22-08-25).

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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AUTHOR'S CONTRIBUTIONS

HAA: Study design, manuscript writing, data analysis
HM: Critical review, data analysis & interpretation
USM: Data collection, data analysis, study design
BA: Data collection, data interpretation
RA: Data analysis, critical review
MBM: Concept of study, critical review
All Authors: Approval of the final version of the manuscript to be published

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