

Research Article

Effectiveness of Molidrain Bag Versus Bottle Drain on Nasogastric Tube Drainage among Children undergone Abdominal Surgery at Pediatric Surgical Ward, GRH, Madurai.

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Abstract:

Background: Nasogastric tube drainage is an essential component of postoperative care among children undergoing abdominal surgery, as it facilitates gastric decompression, prevents complications, and promotes recovery. The effectiveness of different drainage systems influences postoperative outcomes. **Aim:** To evaluate the effectiveness of Molidrain bag versus bottle drain on nasogastric tube drainage among children undergoing abdominal surgery. **Methodology:** A quantitative true experimental pretest-posttest research design was adopted. The study was conducted in the Pediatric Surgical Ward, Government Rajaji Hospital, Madurai. Sixty children who underwent abdominal surgery and required nasogastric tube drainage were selected through simple random sampling and randomly assigned to Intervention Group I (Molidrain bag, n=30) and Intervention Group II (Bottle drain, n=30). Data were collected using a structured observational checklist. Descriptive and inferential statistics, including frequency, percentage, chi-square test, and independent t-test, were used for analysis. **Results:** The baseline socio-demographic and clinical characteristics were comparable between the groups. The mean score in the Molidrain bag group increased from 3.23 ± 1.19 to 10.00 ± 0.83 ($t=31.81$, $p<0.001$), while in the bottle drain group it increased from 3.36 ± 1.37 to 5.57 ± 1.48 ($t=9.10$, $p<0.001$). **Conclusion:** The study demonstrated that the Molidrain bag was significantly more effective than the bottle drain in improving nasogastric tube drainage and promoting postoperative recovery among children undergoing abdominal surgery. It can be recommended as an effective postoperative drainage method in pediatric surgical settings.

Keywords: Nasogastric tube, Post operative care, abdominal surgery

INTRODUCTION

Children are vital to a nation's future, and their health and well-being play a crucial role in national development. India has one of the largest child populations globally, making child health a significant public health priority. Early childhood, particularly the first six years of life, is a critical period for physical, mental, and social development. Ensuring healthy growth during this stage contributes to the creation of a productive and healthy future population. According to the World Health Organization (1948), child health encompasses physical, mental, intellectual, social, and emotional well-being rather than merely the absence of disease. Various illnesses can affect children, with gastrointestinal disorders being among the most common. Conditions such as intestinal obstruction, intussusception, pyloric stenosis, and other digestive disorders often require surgical intervention when conservative management is unsuccessful.

Abdominal surgery is frequently performed in children to manage these conditions. Postoperative care is essential for successful recovery and includes wound management, nutritional support, fluid balance, and gastric decompression. Nasogastric tube (NGT) drainage is commonly used after abdominal surgery to decompress the stomach, reduce vomiting, prevent aspiration, and facilitate early recovery. Continuous drainage through NGT helps monitor gastrointestinal function and supports postoperative management. Different drainage systems are available for NGT management. Traditional bottle drains depend primarily on gravity, whereas Molidrain bags use a closed negative-pressure system that may enhance drainage efficiency and promote faster gastric decompression. Effective drainage may contribute to improved postoperative recovery and reduced complications in children undergoing abdominal surgery. Abdominal surgeries are commonly performed in children with gastrointestinal disorders, making effective postoperative care essential. Nasogastric drainage is a key component of postoperative management, as it facilitates gastric decompression, prevents aspiration, and promotes recovery. Despite the widespread use of bottle drains, recovery outcomes remain suboptimal in many settings. Studies indicate a considerable burden

of children undergo gastrointestinal surgical procedures annually, and existing evidence suggests that bottle-drain systems provide only moderate effectiveness in achieving gastric decompression and early recovery. The Molidrain bag, which operates using controlled negative pressure, may offer superior drainage compared to conventional bottle drains. Improved drainage efficiency could enhance gastric decompression, accelerate recovery, and reduce postoperative complications. Therefore, evaluating the effectiveness of Molidrain bags versus bottle drains in children undergoing abdominal surgery is important for identifying the most effective postoperative drainage method and improving pediatric surgical outcomes.

AIM OF THE STUDY

The study aimed to evaluate the effectiveness of Molidrain bag (Intervention group I) versus Bottle drain (Intervention group II) on level of nasogastric tube drainage among children undergone abdominal surgery.

METHODOLOGY

The study employed a quantitative experimental approach using a randomized pretest–posttest design to compare the effectiveness of Molidrain bags and bottle drains in promoting nasogastric tube drainage among children following abdominal surgery. Conducted in the Pediatric Surgical Ward of Government Rajaji Hospital, Madurai, the study included 60 postoperative children who were randomly assigned to either the Molidrain bag group or the bottle drain group. Data were gathered using a structured instrument comprising demographic details, clinical characteristics, and a 12-item observational checklist to evaluate drainage effectiveness. The tool underwent expert validation and demonstrated good reliability ($r = 0.85$). Prior ethical approval and informed consent from caregivers were obtained before data collection. A pilot study confirmed the feasibility of the research procedures. Statistical analysis involved descriptive measures such as frequencies and percentages, along with inferential tests including the independent t-test and chi-square test. Participant confidentiality, anonymity, and the right to withdraw from the study were ensured throughout the research process.

RESULT

Table 1 shows the socio-demographic characteristics of children in both intervention groups. In Intervention Group I, the majority were above 6 years of age (46.67%), male (60%), Hindu (73.33%), from rural areas (50%), second-born children (56.67%), had one sibling (43.33%), belonged to nuclear families (56.67%), and consumed a mixed diet (70%). Similarly, in Intervention Group II, most children were above 6 years (43.33%), male (70%), Hindu (66.67%), from rural areas (60%), second-born children (70%), had one sibling (60%), belonged to nuclear families (53.33%), and followed a mixed diet (66.67%). The findings indicate that the socio-demographic characteristics were comparable between the two groups.

Table 2 presents the clinical characteristics of children undergoing abdominal surgery. All children in both groups underwent major surgery (100%) and had abdominal distension (100%). Absence of bowel sounds was observed among 80% of children in Group I and 83.33% in Group II. The majority were maintained in the left lateral position (63.33% in both groups). Greenish nasogastric drainage was noted among 56.67% of children in Group I and 60% in Group II. Most children had drainage volumes greater than 15 ml (73.33% and 76.67%, respectively), and passive mobilization was observed among 73.33% of children in Group I and 70% in Group II.

Table 3 depicts the pretest and posttest levels of nasogastric tube drainage among children in both intervention groups. During the pretest, the majority of children in both Group I and Group II had ineffective drainage (90%), while 10% had moderately effective drainage. Following the intervention, 96.67% of children in the Molidrain bag group achieved highly effective drainage, with no child remaining in the ineffective category. In contrast, in the bottle drain group, 63.33% achieved moderately effective drainage and 36.67% remained ineffective, while none attained a highly effective level. These findings suggest better improvement in nasogastric tube drainage among children receiving the Molidrain bag.

Table 4 compares the pretest and posttest mean scores of nasogastric tube drainage between the two groups. In the Molidrain bag group, the mean score increased significantly from 3.23 ± 1.19 during pretest to 10.00 ± 0.83 during posttest, with a mean difference of 6.77 and a highly significant t value of 31.81 ($p < 0.001$). In the bottle drain group, the mean score increased from 3.36 ± 1.37 to 5.57 ± 1.48 , with a mean difference of 2.21 and a highly significant t value of 9.10 ($p < 0.001$). The larger mean difference observed in the Molidrain bag group demonstrates that the Molidrain bag was more effective than the bottle drain in enhancing nasogastric tube drainage among children undergoing abdominal surgery.

DISCUSSION

The findings of the study revealed that the socio-demographic and clinical characteristics of children in both intervention groups were comparable, indicating baseline homogeneity. During the pretest assessment, the majority of children in both the Molidrain bag group (90%) and the bottle drain group (90%) had ineffective nasogastric tube drainage, with only 10% showing moderately effective drainage. Following the intervention, a remarkable improvement was observed in the Molidrain bag group,

drainage and 36.67% continuing to have ineffective drainage. The mean posttest score in the Molidrain bag group increased from 3.23 ± 1.19 to 10.00 ± 0.83 , with a mean difference of 6.77 ($t = 31.81$, $p < 0.001$). In the bottle drain group, the mean score increased from 3.36 ± 1.37 to 5.57 ± 1.48 , with a mean difference of 2.21 ($t = 9.10$, $p < 0.001$). Although both interventions were effective, the Molidrain bag demonstrated substantially greater improvement in nasogastric tube drainage compared with the bottle drain. These findings indicate that the Molidrain bag is more effective than the conventional bottle drain in promoting nasogastric tube drainage and facilitating postoperative recovery among children undergoing abdominal surgery.

CONCLUSION

The study concluded that both the Molidrain bag and bottle drain improved nasogastric tube drainage among children undergoing abdominal surgery. However, the Molidrain bag was found to be significantly more effective than the bottle drain. Children in the Molidrain bag group demonstrated a higher posttest mean score (10.00 ± 0.83) and a greater proportion of highly effective drainage (96.67%) compared to those in the bottle drain group. The statistically significant improvement observed in the Molidrain bag group ($t = 31.81$, $p < 0.001$) indicates its superiority in achieving effective gastric decompression. Therefore, the Molidrain bag can be recommended as an effective postoperative drainage method for children undergoing abdominal surgery to promote better nasogastric drainage and enhance recovery.

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Table 1: Distribution of nasogastric tube drainage among children undergone abdominal surgery according to their socio demographic variables both in intervention group I and intervention group II. N=60

Variable	Category	Intervention Group I (n=30) f (%)	Intervention Group II (n=30) f (%)
Age of the Child	<1 year	6 (20.0)	4 (13.3)
	1–3 years	4 (13.3)	5 (16.7)
	3–6 years	6 (20.0)	8 (26.7)
	>6 years	14 (46.7)	13 (43.3)
Gender	Male	18 (60.0)	21 (70.0)
	Female	12 (40.0)	9 (30.0)
Religion	Hindu	22 (73.3)	20 (66.7)
	Christian	4 (13.3)	5 (16.7)
	Muslim	4 (13.3)	5 (16.7)
Place of Domicile	Urban	5 (16.7)	4 (13.3)
	Semi-Urban	10 (33.3)	8 (26.7)
	Rural	15 (50.0)	18 (60.0)
Order of Birth	First	10 (33.3)	5 (16.7)
	Second	17 (56.7)	21 (70.0)
	Third and Above	3 (10.0)	4 (13.3)
Number of Siblings	Nil	10 (33.3)	5 (16.7)
	One	13 (43.3)	18 (60.0)
	Two and More	7 (23.3)	7 (23.3)
Type of Family	Nuclear	17 (56.7)	16 (53.3)
	Joint	8 (26.7)	9 (30.0)
	Extended	5 (16.7)	5 (16.7)
Father's Education	Non-formal	5 (16.7)	5 (16.7)
	Primary	4 (13.3)	2 (6.7)
	Secondary	12 (40.0)	12 (40.0)
	Higher Secondary	4 (13.3)	6 (20.0)
	Diploma & Above	5 (16.7)	5 (16.7)
Mother's Education	Non-formal	3 (10.0)	3 (10.0)
	Primary	3 (10.0)	2 (6.7)
	Secondary	9 (30.0)	8 (26.7)
	Higher Secondary	7 (23.3)	11 (36.7)
	Diploma & Above	8 (26.7)	6 (20.0)
Father's Occupation	Self-employed	11 (36.7)	10 (33.3)
	Private Employee	9 (30.0)	9 (30.0)
	Government Employee	5 (16.7)	4 (13.3)
	Others	5 (16.7)	7 (23.3)
Mother's Occupation	Self-employed	11 (36.7)	11 (36.7)
	Private Employee	15 (50.0)	19 (63.3)
	Government Employee	0 (0.0)	0 (0.0)
	Others	4 (13.3)	0 (0.0)
Monthly Family Income	< ₹5,000	21 (70.0)	19 (63.3)
	₹5,001–10,000	9 (30.0)	11 (36.7)
	₹10,001–15,000	0 (0.0)	0 (0.0)
	> ₹15,000	0 (0.0)	0 (0.0)
Dietary Habit	Vegetarian	9 (30.0)	10 (33.3)
	Mixed Diet	21 (70.0)	20 (66.7)

Table 2: Distribution of nasogastric tube drainage among children undergone abdominal surgery according to their clinical variables both in intervention group I and intervention group II. N=60

S. No	Clinical variables		Group			
			Intervention group -I		Intervention group – II	
			f	%	f	%
1.	Type of surgery	Major surgery	30	100%	30	100%
		Minor surgery	0	0%	0	0%
2.	Presence of bowel sounds	Yes	6	20%	5	16.67%
		No	24	80%	25	83.33%
3.	Presence of	Yes	30	100%	30	100%
	Abdominal distension	No	0	0%	0	0%
4.	Position of the child	Supine position	6	20%	6	20%
	preferably enhancing	Right lateral position	5	16.67%	5	16.67%
	the nasogastric tube	Left lateral position	19	63.33%	19	63.33%
	drainage					
5.	Symptoms while	Gagging or vomiting	6	20%	7	23.33%
	inserting nasogastric	Aspiration	0	0%	0	0%
	tube to be observed, if	Tissue trauma	5	16.67%	6	20%
	any	All of the above	19	63.33%	17	56.67%
6.	Color of nasogastric	Greenish color	17	56.67%	18	60%
	tube drainage	Yellowish color	8	26.67%	7	23.3%
		Brownish color	5	16.67%	5	16.67%
7.	Amount of nasogastric	< 5 ml	0	0%	0	0%
	tube drainage	6 – 10 ml	0	0%	0	0%
		11 – 15 ml	8	26.67%	7	23.33%
		> 15ml	22	73.33%	23	76.67%
8.	Mobilization	Active	8	26.67%	9	30%
		Passive	22	73.33%	21	70%

Table 3: Frequency and Percentage Distribution of Pretest and Posttest Levels of Nasogastric Tube Drainage among Children Undergoing Abdominal Surgery in Intervention Group I and Intervention Group II (N = 60)

Level of Nasogastric Tube Drainage	Intervention Group I (Molidrain Bag) (n=30)		Intervention Group II (Bottle Drain) (n=30)	
	Pretest f (%)	Posttest f (%)	Pretest f (%)	Posttest f (%)
Ineffective	27 (90.0)	0 (0.0)	27 (90.0)	11 (36.7)
Moderately Effective	3 (10.0)	1 (3.3)	3 (10.0)	19 (63.3)
Highly Effective	0 (0.0)	29 (96.7)	0 (0.0)	0 (0.0)
Total	30 (100.0)	30 (100.0)	30 (100.0)	30 (100.0)

Group	Assessment	Mean	Mean Difference	Standard Deviation	t-value	Significance
Intervention Group I (Molidrain Bag)	Pretest	3.23	6.77	1.19	31.81	p < 0.001 (HS)
	Posttest	10.00		0.83		
Intervention Group II (Bottle Drain)	Pretest	3.36	2.21	1.37	9.10	p < 0.001 (HS)
	Posttest	5.57		1.48		

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