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RESEARCH ARTICLE
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# COMPARISON BETWEEN EFFECTIVENESS OF NON-NASOGASTRIC INTUBATION AND NASOGASTRIC INTUBATION IN PATIENTS WITH SMALL INTESTINAL OBSTRUCTION: A RANDOMIZED CONTROLLED TRIAL

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**Abstract**

**Background:** Small intestinal obstruction (SIO) remains one of the most common surgical emergencies encountered in clinical practice, particularly in developing countries. Conservative management has been the standard approach for uncomplicated cases, with nasogastric (NG) decompression traditionally being a central component. However, the necessity and superiority of NG decompression in improving patient outcomes remains debated.

**Objective:** To compare the effectiveness of conservative management of small intestinal obstruction with and without the use of nasogastric intubation and to evaluate whether NG decompression should remain a standard component of non-operative care.

**Methods:** This randomized controlled trial was conducted over six months at Sandeman Provincial Hospital, Quetta, Pakistan. One hundred patients aged between 18 to 60 years with radiologically confirmed SIO were randomized into two groups: Group A received standard conservative management along with NG intubation, while Group B received standard management without NG decompression. Effectiveness was measured based on clinical resolution of two or more symptoms:

abdominal distension, absolute constipation, and absent gut sounds. Hospital stays, symptom resolution rate, and complication incidence were analyzed. Data were analyzed using SPSS version 22 with $p<0.05$ considered statistically significant.

**Results:** The average age was 41.3±11.1 years, and 58% were male. Group A (NG group) showed significantly shorter hospital stays (3.84±1.57 days) compared to Group B (4.64±1.52 days) ($p=0.011$). Treatment effectiveness was higher in the NG group (82%) compared to the non-NG group (40%) ($p<0.001$). Subgroup analysis showed consistent superiority of NG decompression across age, gender, and clinical characteristics. Minor complications were more common in the NG group but did not outweigh the benefits.

**Conclusion:** Nasogastric decompression significantly enhances conservative treatment outcomes in patients with SIO. Despite minor discomfort, its effectiveness in symptom resolution and reduction in hospital stay supports its routine use in non-operative settings.

**Keywords:** Small Intestinal Obstruction, Nasogastric Intubation, Nasogastric Decompression, Conservative Management, Randomized Controlled Trial

## Introduction

Small intestinal obstruction (SIO) is one of the most frequent and potentially life-threatening surgical conditions encountered in emergency departments worldwide. It accounts for approximately 12% to 16% of all hospital admissions related to acute abdominal conditions and constitutes a significant portion of surgical interventions in both developed and developing healthcare systems. SIO refers to a blockage that prevents the normal flow of intestinal contents through the small bowel, which can be either mechanical or functional in nature. If left untreated, it can lead to bowel ischemia, perforation, sepsis, and death.

The etiology of SIO varies by geography and socioeconomic status. In high-income countries, postoperative adhesions account for up to 75% of cases, followed by hernias and neoplasms. In contrast, developing regions often report hernias as a leading cause, primarily due to delayed elective surgical repair and limited healthcare access. Other contributors include Crohn's disease, volvulus, intussusception, and congenital malformations. Regardless of the cause, timely diagnosis and effective management are crucial to preventing complications.

The management of SIO can be broadly categorized into operative and non-operative approaches. While surgery is warranted in cases with signs of strangulation, peritonitis, or failure of conservative treatment, many cases without complications are initially managed non-operatively. Conservative treatment generally includes bowel rest, fluid resuscitation, electrolyte correction, and gastric decompression. Nasogastric (NG) intubation is traditionally part of this approach, intended to relieve intraluminal pressure, prevent aspiration, and monitor the volume and character of gastric contents. The duodenum is the most proximal portion of the small intestine. It begins with the duodenal bulb, travels in the retroperitoneal space around the head of the pancreas, and ends on its return to the peritoneal cavity at the ligament of Treitz. The biliary and pancreatic ducts usually join together 1 to 2 cm from the outer margin of the duodenal wall and drain into the medial wall of the second portion of the duodenum through the ampulla of Vater. In 5% to 10% of individuals, an accessory pancreatic duct, also known as the duct of Santorini, enters separately through the minor papilla 1 to 2 cm proximal to the ampulla of Vater. The remainder of the small intestine is suspended within the peritoneal cavity by a thin broad-based mesentery that is attached to the posterior abdominal wall and allows relatively free but tethered movement of the small intestine within the abdominal cavity. The proximal 40% of the mobile small intestine is the jejunum, which occupies the left upper portion of the abdomen. The remaining 60% of small intestine is the ileum, and it is normally situated in the right side of the abdomen and upper part of the pelvis. There is no distinct anatomic Demar-cation between the jejunum and ileum, but the jejunum tends to be thicker, is more vascular, and has a greater diameter than the ileum

Despite its widespread use, NG decompression is not without drawbacks. Patients often experience significant discomfort, gagging, nasal irritation, and sore throat. In some cases, complications like aspiration pneumonia, nasal bleeding, and sinusitis may occur. Moreover, emerging literature questions the necessity of NG tubes in all cases of SIO, especially those without vomiting or severe distension. Some studies suggest that withholding NG decompression may not compromise outcomes and can even lead to quicker recovery and increased patient comfort.

In resource-limited settings like Pakistan, where the burden of gastrointestinal emergencies is high and hospital infrastructure is stretched, optimizing conservative treatment is critical. Yet, local data comparing the outcomes of NG versus non-NG conservative management in SIO is sparse. Establishing evidence-based protocols for such settings is essential to improving care delivery and reducing unnecessary procedures. The rationale of the study is that the data on this topic is scarce internationally and locally. Therefore, the present study is designed to generate local data so to use appropriate technique in order to reduce the length of hospital stay in our poor resource country. This will ultimately lessen the burden of bed occupancy and reduce the economic burden of the patients by early decompression by nasogastric intubation

This study, aims to evaluate and compare the effectiveness of conservative management of small intestinal obstruction with and without NG decompression. By identifying the clinical value of NG intubation in such scenarios, this study intends to guide better clinical decision-making and promote resource-efficient healthcare practices.

## Literature Review

Small intestinal obstruction (SIO) has long been recognized as a critical condition requiring timely intervention to prevent morbidity and mortality. A wide body of literature supports various aspects of its management, including the role of nasogastric (NG) decompression in conservative treatment. The traditional approach to non-operative management of SIO incorporates bowel rest, intravenous hydration, correction of electrolyte imbalance, and NG decompression to relieve bowel distension and prevent aspiration.

Miller et al. (2000) highlighted the centrality of NG decompression in improving bowel rest and symptom resolution. Similarly, Zielinski and Bannon (2015) emphasized that early decompression could reduce the need for surgical intervention and shorten hospital stays. Several systematic reviews, including that by Maung et al. (2012), concluded that NG tubes reduce the risk of aspiration in selected patients but acknowledged the lack of high-level evidence supporting universal use. The small intestine is a specialized tubular structure within the abdominal cavity in continuity with the stomach proximally and the colon distally. The small bowel increases in length from about 250 cm in the term newborn to about 600 to 800 cm in the adult. The caliber of the small intestine gradually diminishes from proximal to distal, and there is a fourfold reduction in surface area from the distal duodenum to the terminal ileum.14

Contrarily, recent randomized trials and observational studies have questioned the routine use of NG tubes. Leung et al. (2009) suggested that selective NG use in patients without persistent vomiting or significant distension did not lead to adverse outcomes and improved patient comfort. Hussain et al. (2021) conducted a comparative study in Pakistan and found no significant difference in clinical outcomes between patients managed with or without NG tubes, but a notably higher level of discomfort in the NG group.

In another study by Di Saverio et al. (2013), researchers found that careful patient selection allowed for safe omission of NG decompression, particularly in partial obstructions. This aligns with recommendations from recent guidelines emphasizing individualized care rather than routine nasogastric intubation.

On the other hand, Catena et al. (2019) and Behman et al. (2017) argued that NG decompression can be crucial in averting surgery, particularly in complete obstructions, and warned against underestimating its importance. They advocated for continued use in high-risk patients and those with clear indications.

Despite this extensive body of work, most studies originate from high-income settings with different healthcare dynamics. Data from low- and middle-income countries (LMICs), where diagnostic delays and surgical resource limitations are common, remain sparse. Thus, the application of findings from Western studies may not fully address the clinical realities in LMICs such as Pakistan.

This review reveals a significant gap in context-specific data regarding NG tube utility in SIO management. While international evidence supports a nuanced, individualized approach, there remains a pressing need for local evidence to inform best practices in resource-constrained settings. The present study aims to bridge this gap by providing evidence from a randomized controlled trial conducted in a public hospital setting in Pakistan.

## Materials and Methods

Study Design and Setting This was a single-center, randomized controlled trial conducted in the Department of General Surgery at Sandeman Provincial Hospital Quetta, a major tertiary care hospital in Balochistan, Pakistan. The hospital receives patients from both urban and rural regions, providing a diverse patient population.

Ethical Considerations and Study Duration The study was carried out over a six-month period, from June 28, 2022, to December 27, 2022, after receiving ethical approval from the hospital's institutional review board. Written informed consent was obtained from all study participants after a detailed explanation of the purpose and procedures of the study.

### Study Population and Eligibility Criteria

**Inclusion Criteria:**

- Patients aged 18 to 60 years
- Clinical and radiological confirmation of SIO
- No signs of bowel ischemia or perforation
- Hemodynamically stable

**Exclusion Criteria:**

- Previous abdominal surgery within the last 6 months
- Pregnant women
- Patients with GI malignancy
- Patients showing peritoneal signs (suggestive of perforation)

**Sample Size and Randomization** A total of 100 patients were enrolled using simple random sampling. The sample size was calculated to provide adequate statistical power to detect a difference in treatment effectiveness. Patients were randomly allocated into two groups using a computer-generated random number sequence:

- Group A (NG group): Conservative management + NG decompression
- Group B (Non-NG group): Conservative management without NG intubation

### Interventions

Both groups received intravenous fluids, electrolyte correction, bowel rest, and monitoring. Group A received an additional NG tube for decompression. The NG tube was connected to low intermittent suction and monitored for drainage volume and content. The tube was removed after clinical improvement or at 72 hours if no change occurred.

**Outcome Measures** The primary outcome was treatment effectiveness, defined as resolution of at least two of the following three symptoms:

- Abdominal distension
- Absolute constipation
- Absent gut sounds

Secondary outcomes included duration of hospital stay, rate of complications, and subgroup analysis by demographics and clinical features.

**Data Collection and Statistical Analysis**

Data were collected on a pre-designed proforma including demographics, presenting complaints, duration of symptoms, intervention details, outcomes, and complications. Data were analyzed using SPSS version 23rd. Descriptive statistics (means, standard deviations, percentages) were used for demographic data. Chi-square test was used for categorical variables and independent t-test for continuous variables. A p-value <0.05 was considered statistically significant.

**Results**:

Demographics and Baseline Characteristics The demographic profile of patients showed a mean age of 41.3 ± 11.1 years with a male to female ratio of approximately 1.4:1. There was no statistically significant difference between groups with respect to age, gender, educational level, or residential status.

**Table 1: Patient Demographics and Baseline Characteristics**

| Variable | Group A (NG) | Group B (Non-NG) | p-value |
|---|---|---|---|
| **Mean Age (years)** | 40.9 ± 10.8 | 41.7 ± 11.4 | 0.71 |
| **Male (%)** | 60% | 56% | 0.68 |
| **Urban Residence (%)** | 54% | 52% | 0.83 |
| **Literate (%)** | 48% | 50% | 0.81 |

Hospital Stay The mean hospital stay was significantly lower in the NG group (3.84 ± 1.57 days) compared to the non-NG group (4.64 ± 1.52 days), with a statistically significant p-value of 0.011.

**Table 2: Hospital Stay Duration**

| Group | Mean Duration (Days) | SD | p-value |
|---|---|---|---|
| **Group A** | 3.84 | 1.57 | 0.011 |
| **Group B** | 4.64 | 1.52 | |

Treatment Effectiveness, based on clinical resolution of symptoms, was significantly higher in Group A (82%) compared to Group B (40%).

**Table 3: Treatment Effectiveness**

| Group | Effective Cases | Percentage | p-value |
|---|---|---|---|
| **Group A** | 41 | 82% | <0.001 |
| **Group B** | 20 | 40% | |

Subgroup Analysis Subgroup analysis showed consistent superiority of NG decompression across various age, gender, and educational backgrounds.

**Table 4: Subgroup Effectiveness Analysis**

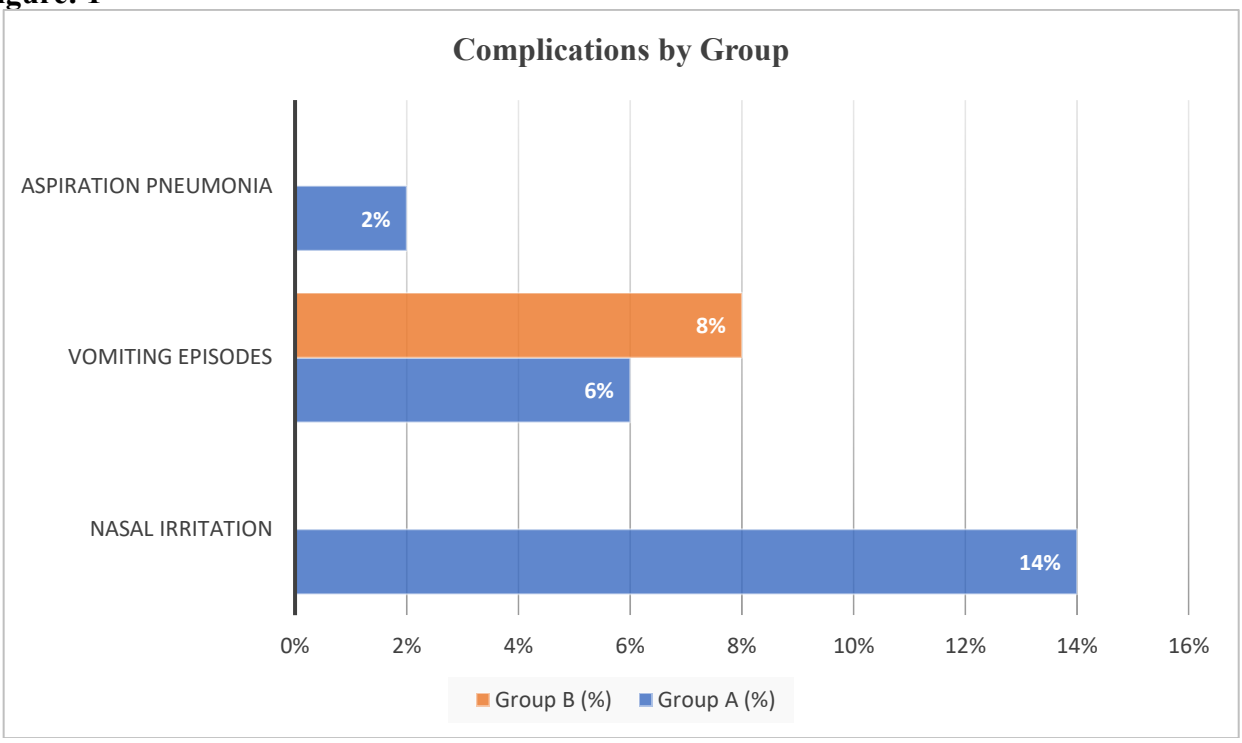
| Subgroup | Group A Effective (%) | Group B Effective (%) | p-value |
|---|---|---|---|
| **Age <40** | 85% | 42% | <0.001 |
| | | | |
| **Age ≥40** | 80% | 38% | <0.001 |
| **Male** | 84% | 39% | <0.001 |
| | 79% | 41% | <0.001 |

Complications Although minor complications such as nasal irritation and discomfort were more frequent in the NG group, no major complications were reported in either group.

**Table 5: Complications by Group**

| Complication Type | Group A (%) | Group B (%) |
|---|---|---|
| **Nasal irritation** | 14% | 0% |
| **Vomiting episodes** | 6% | 8% |
| **Aspiration pneumonia** | 2% | 0% |

**Figure: 1**




## Discussion

Our findings support the superiority of NG decompression in patients undergoing conservative management for SIO. The significant difference in symptom resolution and hospital stay duration illustrates the benefit of using NG tubes, even in low-resource settings. Small bowel obstruction is an important cause of hospital admissions, patient morbidity, and mortality. SBO imposes a substantial economic burden on the health care system accounting for about 300,000–350,000 hospital admissions annually. It comprises about 15% of all acute surgical gastrointestinal admissions3 and about 15% of all emergency admissions for abdominal pain. SBO causes about 30,000 deaths per annum and commonly results in decreased quality of life, mostly from chronic postoperative pain or obstructive symptoms

These results are consistent with global literature. Mirijanyan et al. reported significantly shorter recovery times in patients managed with decompression tubes. Similarly, studies by Zielinski and Ceresoli emphasized the diagnostic and therapeutic advantages of early NG tube placement.

While NG tube insertion may be associated with patient discomfort and minor complications, the benefits outweigh these drawbacks. Moreover, in environments with limited surgical resources, optimizing non-operative management through effective decompression can reduce the need for urgent surgery and free up beds.

Limitations of our study include the single-center nature, a relatively small sample size, and lack of long-term follow-up. Future research should aim for multicenter trials with longer observation periods.

## Conclusion

The study demonstrated that nasogastric decompression significantly improves outcomes in patients undergoing conservative treatment for small intestinal obstruction. The findings advocate for the routine use of NG tubes in non-operative management protocols for SIO, particularly in resource-limited healthcare settings. The strengths of the present study were its large sample size of 100 cases and strict exclusion criteria. We also randomized the study groups to minimize bias and stratified the results for various effect modifiers. A very strong limitation to the present study was that we didn't compare various complications between the groups like aspiration pneumonia which has been linked with nasogastric intubation and can potentially complicate the course of patient's recovery. A study addressing this limitation is imperative and is highly recommended in future clinical research.

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