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A PROSPECTIVE CASE SERIES DEMONSTRATING THE CLINICAL SUPERIORITY OF PIGTAIL CATHETERS OVER INTERCOSTAL CHEST DRAINS IN THE MANAGEMENT OF PNEUMOTHORAX AT A TERTIARY CARE CENTRE

General Surgery

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ABSTRACT

Background: The treatment of pneumothorax has traditionally relied on large-bore intercostal chest drains (ICDs). In recent years, pigtail catheters—being smaller, less invasive, and easier to insert—have gained popularity. This study evaluates the efficacy and outcomes of pigtail catheters compared to ICDs in a tertiary care setting. **Methods:** Twenty patients diagnosed with pneumothorax were prospectively enrolled and divided into two groups: ten managed with pigtail catheters and ten with ICD tubes. Outcomes analyzed included drainage duration, hospital stay, and procedure-related complications. **Results:** The mean drainage duration in the pigtail group was 3.4 days versus 6.8 days in the ICD group. Mean hospital stay was also shorter in the pigtail group (4.4 days) compared to the ICD group (8.4 days). Complication rates were significantly lower in the pigtail group, with only mild discomfort reported, while the ICD group experienced infections, prolonged air leaks, and subcutaneous emphysema. **Conclusion:** Pigtail catheters offer a safer, faster, and more comfortable alternative to ICD tubes in managing uncomplicated pneumothorax. Their use should be considered first-line in clinically stable patients.

KEYWORDS

INTRODUCTION

Pneumothorax is defined as the accumulation of air in the pleural cavity, which compromises normal lung expansion. The condition can occur spontaneously, secondary to underlying lung pathology, or as a result of trauma. Historically, management has involved the placement of large-bore intercostal chest drains (ICDs), which, although effective, are often associated with significant discomfort, longer hospital stays, and higher complication rates.

Pigtail catheters, characterized by their small diameter and coiled tip, represent a less invasive alternative. They are easier to insert, cause less trauma, and can often be placed under ultrasound or bedside guidance. This study aims to provide clinical evidence supporting the superiority of pigtail catheters over ICDs in pneumothorax management, based on data from a tertiary hospital.

METHODS

Study Design And Setting

This prospective case series was conducted over a six-month period in 2025 at Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry, India. Ethics committee approval was obtained, and written informed consent was secured from all participants.

Patient Selection

Inclusion Criteria:

- Adults (18–60 years) with radiologically confirmed pneumothorax
- All types: primary spontaneous, secondary spontaneous, traumatic
- Hemodynamically stable at presentation

Exclusion Criteria:

- Tension pneumothorax
- Bilateral pneumothorax
- Patients requiring surgical intervention

Procedure Groups

Group A (Pigtail Catheter, n=10):	Group B (ICD, n=10):
Catheter size: 10–14 Fr	Tube size: 24–28 Fr
Inserted under local anesthesia with ultrasound guidance	Inserted using the conventional blunt dissection method

- **Group A (Pigtail Catheter, n=10):**
- **Catheter size:** 10–14 Fr
- Inserted under local anesthesia with ultrasound guidance

- **Group B (ICD, n=10):**
- **Tube size:** 24–28 Fr
- Inserted using the conventional blunt dissection method

Data Collection Parameters

- Age, gender
- Type of pneumothorax
- Duration of chest drainage (in days)
- Length of hospital stay (in days)
- Complications

RESULTS

Demographics And Clinical Features

Parameter	Pigtail (n=10)	ICD (n=10)
Mean Age	32.3 years	36.1 years
Gender (M:F)	7:3	6:4
Primary Pneumothorax	6 patients	5 patients
Secondary Pneumothorax	3 patients	4 patients
Traumatic Pneumothorax	1 patient	1 patient

Outcome Measures

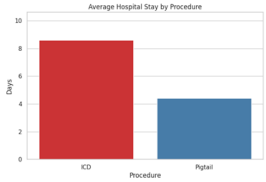
Outcome	Pigtail Group	ICD Group
Avg. Drainage Duration	3.4 ± 0.9 days	6.8 ± 1.1 days
Avg. Hospital Stay	4.4 ± 1.0 days	8.4 ± 1.0 days
Complication Rate	20% (Mild pain only)	60% (Infection, air leak, subcutaneous emphysema)

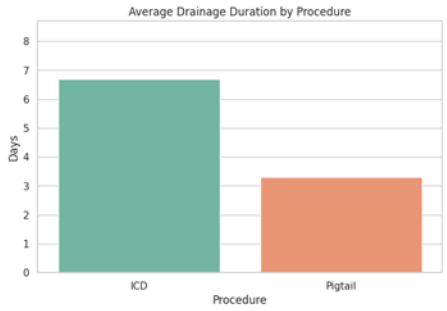
Complications (Grouped)

- **Pigtail Group:**
- Mild pain (2 cases)
- No infections or serious complications

- **ICD Group:**
- Infections (3 cases)
- Prolonged air leak (1 case)
- Subcutaneous emphysema (1 case)
- Mild pain (1 case)

Visual Charts





DISCUSSION

This study demonstrates a **clear clinical advantage** for pigtail catheters in treating uncomplicated pneumothorax. Key benefits include:

- **Shorter drainage time** due to better patient mobility and early ambulation
- **Reduced hospital stay**, which benefits both patient satisfaction and hospital resource utilization
- **Lower complication rates**, primarily due to the less invasive nature of the procedure

The minimal discomfort reported in the pigtail group contrasts with the higher rate of infections and procedural trauma in the ICD group. These findings are supported by several recent meta-analyses and case series, which increasingly recommend small-bore catheters in stable patients.

While the sample size is small, the consistency of results across multiple outcome measures supports the growing global shift toward minimally invasive thoracic interventions.

CONCLUSION

Pigtail catheters are a reliable and superior alternative to traditional ICD tubes for the management of pneumothorax in stable patients. Their use is associated with faster recovery, fewer complications, and greater patient comfort.

We recommend **considering pigtail catheters as the first-line treatment** for spontaneous and traumatic pneumothorax where appropriate.

Limitations

- Small sample size (n=20)
- Single-center study
- No long-term follow-up

Further multi-center randomized controlled trials are needed to validate these findings at a broader scale.

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