AMBULATORY MANAGEMENT OF PRIMARY SPONTANEOUS PNEUMOTHORAX (RAMPP): AN OPEN-LABEL RANDOMIZED TRIAL

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THE CLINICAL QUESTION

Is ambulatory management of 'Primary Spontaneous Pneumothorax' (PSP) safe and does it reduce total length of hospitalization?

TAKE HOME MESSAGE

The trial challenges current guidelines and suggests that stable symptomatic PSP can be managed in ambulatory setting with the provision that patients may require further treatment.

- This study showed reduced hospital LOS by managing PSP in ambulatory setting.
- Serious adverse events occurred exclusively in the ambulatory care group (12%).
- The trial challenges current guidelines and suggests that PSP can be treated in ambulatory setting. The main caveat of the ambulatory management is the higher rate of serious adverse events, therefore careful patient selection, close follow up and awareness of available local operational resources should all be taken into account before embracing fully this approach.

BACKGROUND

Spontaneous pneumothorax affects 20000 people in USA and 3000 people in UK each year.

Symptomatic patients often require an intervention with half the patients requiring chest tube insertion leading to average hospitalization for 6-8 days. Although ambulatory management (standard chest tube with one-way valve or integrated apparatus) is possible, it hasn't been assessed for safety or efficacy. Previous studies have noted overall success rate of 86% and successful management in 78% patients. However, this data was mostly comprised of case series, two inadequately powered randomized trials and one systematic review.

Recently, Brown et al noted that conservative management of moderate to large PSP is non- inferior to standard care but the results may have been limited by a radiological primary outcome as well as potential recruitment bias. The RAMPP trial is a pragmatic, open label randomized trial to assess adequacy and safety of ambulatory management of PSP where an intervention was performed.

STUDY DESIGN

Type of trial: Randomized controlled, open-label, multicenter, pragmatic

N: 236 (Ambulatory: 117 v/s Standard: 119) out of 776 screened

Study groups: Symptomatic 'Primary Spontaneous Pneumothorax' managed in ambulatory setting or by standard care based on current BTS guidelines.

Settings: 24 hospitals in United Kingdom with strong link of emergency and respiratory departments

Treatment period and Follow up: 30 days and until 12 months

Primary outcome

Total length of hospital stay (up to 30 days after randomization) and readmission rate (for any reason related to pneumothorax)

Secondary Outcome(s)

- Need for further pleural procedures, surgical referral rates, time until successful completion of treatment
- Adverse events: serious events, pain at insertion site, hematoma or bleeding, subcutaneous emphysema and failure of drainage
- Pain and breathlessness (VAS) score (0-100 mm)
- Recurrence rates up to 7 days and until 12 months
- Total time off work

Intervention(s)

Patient screened for adequacy and randomized 1:1 by minimized algorithm to two groups.

Ambulatory group (A) underwent insertion of 'Rocket Pleural Vent', an IIF catheter attached to a self-contained one-way Heimlich valve and fluid collection chamber either in

anterior mid-clavicular line (2 nd ICS) or mid-axillary (5 th ICS). This was followed by observation for 1-2 h and a chest radiograph.

Standard group (S) underwent intervention based on guidelines by British Thoracic Society: observation, needle aspiration, standard chest tube insertion or both.

Both groups were followed by research team every 1-2 days and underwent thoracic referral if they had persistent air leak on day 4 of insertion of chest tube or ambulatory device, persistent pneumothorax on chest radiograph, patient agreement and no contraindication to thoracic surgery

POPULATION

Inclusion criteria:

- Symptomatic PSP (≥ large pneumothorax ≥ 2 cm at level of hilum)
- Age group of 16 - 55 yrs

Exclusion Criteria:

- Known or suspected lung disease (except well controlled asthma)
- >20 pack year smoking history
- Tension pneumothorax
- Contraindication to thoracic procedure
- Pregnant and lactating women

Baseline characteristics

- Mean age at recruitment = 30 years (SD 8)
- 195 (82%) were male
- 58 (25%) had previous pneumothorax
- 20 (8%) had family history of pneumothorax
- 161 (68%) were current or former smoker – median 8 PY (IQR 5-12)
- 114 (48%) were current or former marijuana smoker
- Most were symptomatic: Chest pain in 213 (90%) and dyspnea in 210 (89%)

OUTCOMES

Primary outcome:

- Total length of hospital stay was lower in ambulatory arm:
  A = 0 days (IQR 0-3) or 4.7 hr (IQR 2.7 – 59.2)
  S = 4 days (IQR 0-8) or 74.7 hr (IQR 6.3 – 178.2)
  Median difference of 2 days (95% CI 1-3 days, p<0.0001)
- Readmission rate was similar: A=15% vs S=19%

Secondary outcomes:

- Ambulatory care required fewer total procedures: A=1.2 (SD 0.5) vs S=1.4 (SD 0.7) p=0.0327. However, the surgical referral rate was similar: A=28% v/s S=22%.
- Time until successful completion of treatment (removal of ambulatory device vs successful outcome of chest tube/ aspiration) was significantly longer in the ambulatory care group: A=3 days vs S=2 days (p<0.004)
- All 14 serious events occurred exclusively in ambulatory arm. A=12% vs S=0% (p<0.0001).
- Total adverse events: pain at insertion site, hematoma or bleeding, subcutaneous emphysema and failure of drainage: A= 55% vs S= 39% (p=0.0155)
- Similar pain and breathlessness (VAS) score (0-100 mm) high at baseline and improved during days 1-4.
- Recurrence rates up to 7 days was lower in ambulatory: A=7% vs S=19% (p=0.02), but up to 12 months was similar: A= 24% vs S= 28% (p=0.22)
- Total time off work was similar: Mean for A=10.7 days (SD 11.9) vs S= 11.5 days (SD 13.0)

Adverse events

- Pain at drainage site
- Minor hemorrhage not requiring any intervention
- Subcutaneous emphysema
- Pleural infection
- Unintentional removal
- Recurrence (new episode after full resolution or after 1 week)
- Worsening of pneumothorax
- Re-expansion pulmonary edema
- Need for further (non-emergency) pleural procedure

Serious events

- Tension pneumothorax
- Chest tube blockage
- Major intrathoracic hemorrhage requiring intervention

COMMENTARY

This is the first randomized controlled trial comparing the ambulatory and standard guidelines based intervention in management of stable symptomatic PSP. Ambulatory approach led to reduced total length of hospital stay, including the initial hospitalization and readmission for any reason related to pneumothorax. Moreover, ambulatory group required fewer total procedures at the expense of longer time to successful completion of treatment, yet the surgical referral rate was similar. This trial also noted similar recurrence rate at 12 months; pain and breathlessness score; and total time off work. One important highlight is that all 14 serious adverse events were noted in ambulatory management.

Limitations of this study include recruitment restricted to working hour in centers with close relationship of emergency and respiratory department and the need for a robust ambulatory system to follow patients on a nearly daily basis. Although some patients in standard care didn't receive pleural aspiration as initial therapy leading to bias toward ambulatory arm, a post-hoc analysis after excluding these patients demonstrated similar outcome. Finally, 12 patients in each group with missing data at 1 week and 30 days were assumed to have no re-admission.

The trial challenges the current BTS guidelines for management of PSP but also highlights the need for careful patient selection since serious adverse events happened exclusively in ambulatory group

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- Rocket Medical UK provided the pleural vent devices and consumables for the trial.
- Several authors disclosed grants from Rocket Medical outside of submitted work. One author disclosed consultancy fee during the conduct of the study

SUGGESTED READING

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ARTICLE CITATION

Hallifax RJ, McKeown E, Sivakumar P, Fairbairn I, Peter C, Leitch A, Knight M, Stanton A, Ijaz A, Marciniak S, Cameron J. Ambulatory management of primary spontaneous pneumothorax: an open-label, randomised controlled trial. The Lancet. 2020 Jul 4;396(10243):139-49.

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