

Heimlich Valve for the Management of Post Operative Air Leak: Our Experience at King Hussein Medical Center-Jordan

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Abstract

Original Research Article

Objective: To evaluate the success rate of controlling air leak using Heimlich valve at our division over the last 5 years. **Methods:** we retrospectively reviewed our data base and filing system for the past five years to find out patients with prolonged air leak who were treated by Heimlich valve and the outcome of their treatment. **Results:** 86 Heimlichvalves were applied to patients with persistent air leak. 69 male and 17 female. Median age was 48 years. Post hydatid cyst excision was the main indication to apply Heimlich valve. The average time of removal was 14 days. Tube site infection was the main complication (6.9%) followed by slippage (1.1%). No mortality. **Conclusion:** Heimlich valve is a safe and effective method to control persistent air leak. It is cost effective by reducing admission days.

Keywords: Heimlich, air leak, pneumothorax, hydatid cyst.

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INTRODUCTION

Persistent air leak is one of the most challenges that face thoracic surgeons worldwide. Many methods, materials and surgical procedures used to prevent or overcome this problem, but finally you might be obliged to use Heimlich valve to safely discharge home your patient [1].

Heimlich valve was first invented by American surgeon called Henry Heimlich on 1965 to avoid using suction post thoracotomy, then it became popular in emergency treatment of pneumothorax and in battle fronts [1]. It is a one way valve that prevent draining air or fluid to return back to chest cavity without the need for underwater seal system.

Persistent air leak can occur in spontaneous pneumothorax, post chest trauma, post lung resection or post-surgical management of hydatid cyst disease. Surgeons used chemical pleurodesis, fibringlue, autologous blood patch and surgical procedures like pleurectomy or cappingonage to prevent or treat persistent air leak [2]. But despite using these materials and methods and recently using staplers in lung resection we still face this problem.

MATERIALS AND METHODS

We retrospectively revised our computerized data system and patient's files to retrieve information regarding patients who were discharged home with Heimlich valve to control persistent air leak from Jan, 2014 till Jan, 2019.

All these patients underwent lung resection or hydatid cyst excision surgery. They had persistent air leak more than one week.

Heimlich valve was used in all patients with persistent air leak of 7 days and were in good general condition to be discharge home. Education and training for patients was done prior to administration. Two hour trial of administration was done under observation in ward before discharge.

Follow up were at 7, 14 and 21 days post discharge as an outpatient clinic basis and a chest X-ray to show expansion.

Criteria for removal were absence of air leak, full expansion and one hour clamp challenge test.

We analyzed data regarding age, gender, causes of air leak, duration needed to stop air leak and removal of Heimlich valve and incidence of complications.

RESULTS

We had 86 patients. 80% were males (69) and only 20% females (17). Age range was from 15 to 78 with median age of 48 year Table-1. Post excision of hydatid cyst was the most common cause of persistent air leak with 84.8% of all cases Table-2.

Follow up in the clinic showed that almost 30% of patients had their air leak stopped by their first visit to the clinic (day 7) and had the Heimlich valve removed. By 14 days the majority had it removed with 90% followed by only 10% who needed 21 days Table-3.

Table-1: Age distribution (n=86)

Age	No.	%
15-25	25	29
26-35	23	26.7
36-45	16	18.6
46-55	9	10.4
56-65	8	9.3
66-75	4	4.6
76-85	1	1.1

Table-2: Causes of persistent air leak

Etiology	No.	%
Metastectomy	2	2.3
Wedge resection	2	2.3
Lung lobectomy	5	5.8
Decortication	4	4.6
Excision hydatid cyst	73	84.8

Table-3: Time of resolving air leak and removal of Heimlich valve

No. of patients	No. of days
26	7
52	14
8	21

All patients had their valve removed by the 21st day with no life threatening complications. 6 patients (6.9%) had minor port site infection that was treated by dressing, one patient (1.1%) had an accidental slippage of the valve, which was managed in the emergency department with reinsertion. No mortality was recorded.

DISCUSSION

Persistent air leak post thoracic surgery can be troublesome and hard to manage even in large and specialized centers. There are large number of methods to deal with it still carries more morbidity and cost to patient and institute [3]. In searching for a cost

effective, safe and reliable method has been discussed a lot in literature with conservative management being the safest. The problem is that it needs in hospital stay which is cost and has some morbidity [4].

The timing of usage of the valve is of debate. In many studies concerning the management of air leaks post pneumothorax and surgery for emphysema they advocated installation of the valve as early as 3 days post operation⁴. In our study and institution we had the protocol to wait till day 7 post op to give the maximum chance for closure in hospital setting and to give the patients the time to learn about the valve.

Regarding post lobectomy air leak it also showed great benefit in controlling troublesome leak [5]. It give time for the traumatized lung to heal on an outpatient setting which greatly allow the patient to be mobile and in his natural environment. It also gives the time for the other lobes to grow in size slowly eliminating the dead space in the chest without applying force by suction [6].

One of the serious complications that mentioned in literature is post Heimlich valve application tension pneumothorax that we didn't face during our practice because we don't apply it on major air leak and we observe the patient in ward for two hours before discharging the patients home [7]. Our patients also didn't complicate by empyema as well that could be due to suitable antibiotic cover [8].

Heimlich valve application could be useful in early discharge of patients who developed post percutaneous lung biopsy pneumothorax as early as 30 minutes post procedure and as effective as 82% without further incident [9].

CONCLUSION

The use of Heimlich valve in the management of prolonged air leak is a safe and cost effective method. More work is needed to establish the best time to insert it.

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