

Postoperative closed chest drainage without an underwater seal: a preliminary report

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Summary

The Aldon's urobag (e.g. simpla S4) which consists of a 2 litre plastic bag with a flutter valve and a drainage tube has been used in 29 consecutive cases as a postoperative pleural drainage system. The age range of patients was between 2 months and 74 years (mean 26.7 years). Indications for pleural drainage included lobectomy (3 cases), decortication (2 cases), lung biopsy (2 cases), Blalock-Taussig shunt (5 cases), patent ductus arteriosus patent ductus arteriosus (PDA) ligation (1 case), closed mitral valvotomy (1 case), oesophageal surgery (13 cases) and chest wall resection (2 cases). The period of pleural drainage ranged from 1 to 8 days (mean 3.75 days). The only operative death was not related to drainage system. No complications were attributable to the drainage system. This alternative chest drainage was found to enhance early ambulation, increase the efficiency of patient nursing and reduced the cost of consumables.

Résumé

L'Urosac Aldon (exemple: Simpla S4) qui consiste en deux litres de sac en plastique avec un clapet à battements et un drain a été employé dans vingt-neuf cas consécutifs comme le système de drainage pleural, post-opératoire. Les âges des patients varient de deux mois à 74 ans (la moyenne = 26,7 ans). Les indications de drainage pleural ont inclus la lobectomie (3 cas) la décortications (2 cas) la biopsie du poumon (2 cas) le shunt Blalock-Taussig (5 cas), la ligation PDA (un cas) la valvotomie mitrale fermée (un cas) la chirurgie oesophaegale (13 cas) et la résection du mur de poitrine (2 cas). La période du drainage pleural varie de un à huit jours (la moyenne = 3,75 jours). Le seul mort opératif n'avait pas de rapport avec le système de drainage. Aucune complication n'est attribuable au système de drainage. Cette nouvelle méthode de drainage de la poitrine améliore l'ambulation avancée augmente l'efficacité du soin des patients et réduit beaucoup le coût des consommables.

Introduction

Since its development by Kenyon in 1916, the underwater seal drainage system has been the standard form of chest drainage [1]. The postoperative pleural space needs to be drained by a fail-safe chest drainage system with specific characteristics [2]. The system of three interconnected bottles developed at the Massachusetts General Hospital in 1945 fulfilled most of these requirements [2]. The deficiencies in the original apparatus (glass elements with multiple connections) have been corrected in commercially available, unitized and foolproof disposable plastic items (e.g., *pleurevac) [2]. This system has been in short supply in Nigeria and the cost, when available, renders its routine use unrealistic.

A lighter, cheaper, easily available, effective alternative has been tried in postoperative patients in South Africa [3,4], Belfast [1] and Birmingham [5]. This alternative, consisting of a graduated plastic bag with a flutter valve, was connected via its drainage tube to a standard intercostal tube. We have previously found a similar system, the Aldons urobag, e.g.,

simpla S4* to be effective in the routine drainage of pleural spaces in non-operated cases in Ibadan (forthcoming). This report communicates our preliminary experience with the use of Aldon's urobag as a chest drainage system in our postoperative patients.

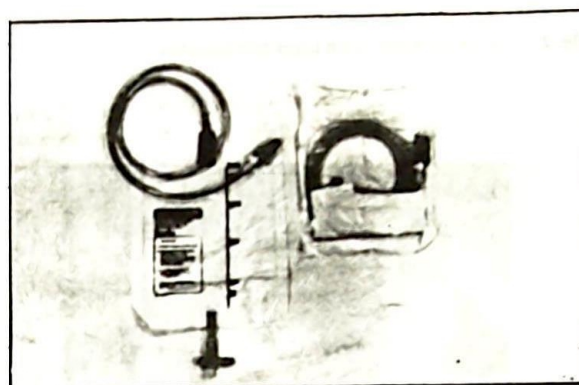


Fig. 1: Simpla S4 brand of Aldon's urobag: (left) out of sterile bag, showing the non-returning flutter valve at the end of drainage tube; (right) in sterile bag.

Methods

The patients included in this study were all cases of elective chest operations done between January and October 1992 in which Aldon's urobag was used as the sole chest drainage system. Figure 1 shows the urobag used in the study. All the operations were done under general anaesthesia with appropriate endotracheal intubation. Standard postero-lateral, anterior thoracotomy or median sternotomy incisions were used.

Total thoracic oesophagectomies were done through the transhiatal approach after cervical and abdominal explorations. Chest wall resections were via appropriate flaps raised on the chest wall. One or two intercostal tubes were indicated according to the envisaged drainage problems. Usually apical and basal tubes were used for pulmonary resections with each tube connected to separate bags. Other adjuncts included an intercostal block with 10 ml of 0.5% marcaine (bupivacaine hydrochloride) (2 ml/space), chest physiotherapy with breathing exercises and regular milking of the chest tube immediately after surgery. In postthoracotomy cases, full lung re-expansion was ensured prior to completion of chest closure. The length of time from the conclusion of the operation to the removal of chest tubes was noted. The standard indication for extubation was applied.

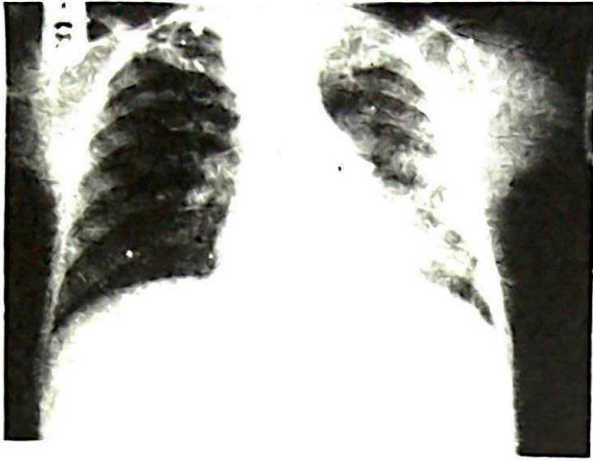


Fig. 2: (a) Metal screw in left upper lobe bronchus

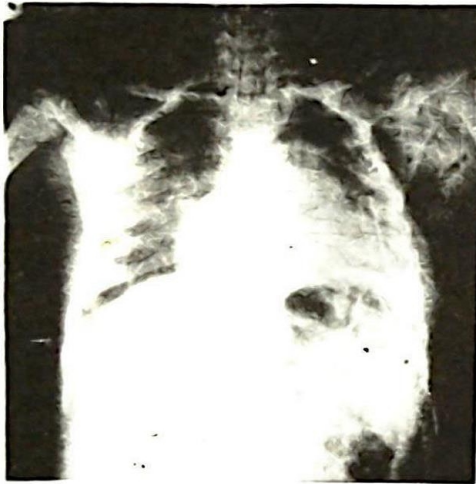


Fig. 2: (b) left upper lobectomy status of the left hemithorax

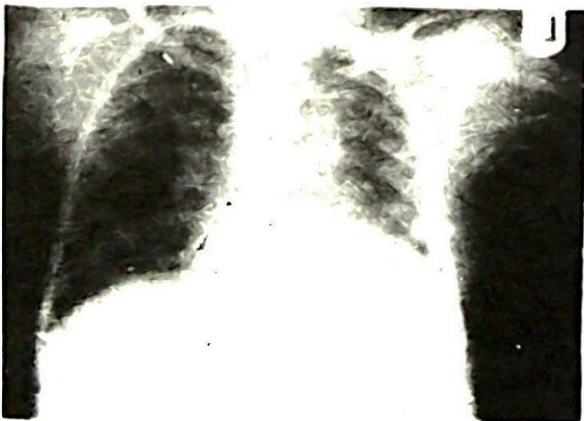


Fig. 2: (c) Left hemithorax at follow up

Results

A total of twenty-nine patients had their pleural spaces drained using Aldon's urobag. Their ages ranged from 2 months to 74 years (mean 26.7 years) and the male to female ratio was 3.8:1.

The indications for pleural drainage included lobectomy (3 cases), decortication (2 cases), lung biopsy (2 cases), Blalock-Taussig Shunt (5 cases), patent ductus arteriosus (PDA) ligation (1 case), closed mitral valvotomy (1 case), transhiatal oesophagectomy complicated by pleural entry (13 cases) and chest wall resection (2 cases). Two chest tubes were used in an adult who had a left lobectomy (LUL) for an aspergillus fungal-ball, in the 2 cases of decortication and in one of the patients who had a lateral chest wall resection. Bilateral pleural drainage was required in 3 cases of transhiatal oesophagectomy complicated by haemopneumothorax. The period of chest drainage ranged from 1 to 8 days (mean 3.75 days). The mean period of chest drainage was 7 days each for decortication and for chest wall resection, while the mean period of chest drainage for lobectomy was 4 days and 3.9 days for haemothorax associated with pleural entry in transhiatal oesophagectomy. The mean period of chest drainage after non-pulmonary procedures (e.g., PDA ligation, Blalock-Taussig shunt, mitral valvotomy) and lung biopsies was 2 days. Figure 2 shows (a) a retained foreign body in left upper lobe bronchus, (b) the immediate post-upper lobectomy status of the remaining lung and (c) a post extubation chest X-ray.

There was only one death on the 7th post operative day in a 6-year-old-patient who had volvulus with gangrene of the small intestine and was reoperated on. The death was not related to the chest drainage system. No complication attributable to the drainage system was observed in this series.

Discussion

In this series, the Aldon's urobag was found to be effective as a post operative pleural drainage system. Suction was not required in any of the patients and postoperative lung re-expansion was satisfactory. This finding accords with those of Graham *et al.* [1] and Thompson [3]. The patients in this series were mobilized early because of the lightness of the drainage system and their smaller storage volume [1]. After surgery children could play around with the suspended bag under their clothes while adults, even with double chest tubes, could hold the bags together while they ambulated.

The drainage system was found to be less cumbersome for the intensive care nurses and ward nurses to manage [3]. There was no possibility of the bag being kicked over like chest bottles [3]. There was no possibility of a back flow of contents into the patient; this obviates the need for clamping the drainage bag during transfer [1,3].

The expected complication of clot obstruction at the flutter valve level seems to be theoretical as this has not been experienced in this study nor in others [1,3,4], though it has been reported with the use of the Heimlich valve [6]. Besides the increased efficiency in patient nursing noticed in our small series, the cost of our consumables has been reduced drastically by the use of this alternative chest drainage system.

Acknowledgements

Our profound gratitude goes to Mr. Daniel A. Adefila who did an excellent secretarial job and to the Biomedical team of the University College Hospital, Ibadan for the illustrations in this work.

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