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The Simple Urine Bag as Wound Drain Post-Craniotomy in a Low-resource Neurosurgical Practice: A Personal 4-year Prospective Cohort Study

A.O. Adeleye[1], A.K. Ukachukwu[2]
[1]Division of Neurological Surgery, Department of Surgery, College of Medicine, University of Ibadan, [1,2]Department of Neurological Surgery, University College Hospital, UCH, Ibadan, Nigeria.
Correspondence to: Dr. A. Olufemi Adeleye, Email: femdoy@yahoo.com

Background: ***In the face of the practical non-availability of custom-made surgical wound drain materials, many other substitutes are used in developing countries. These substitutes have their draw backs from which the Uribag appears to be free. The main objectives: To present our experience with the use of this cheap and readily-available material as post craniotomy wound drain in a Nigerian neurosurgical unit***
Methods: ***A 4-year prospective cohort study of the effectiveness, outcome with use and complications of the Uribag as post craniotomy wound drain in a consecutive cohort of neurosurgical patients. Data analyzed include the patients' brief demographics; the types of cranial surgery in which drain was used; the drain performance, and any associated untoward drain / wound events.***
Results: ***The drain was used for this purpose in 107 patients over 4 years. Nineteen have been excluded from this analysis because they died too soon post op for drain performance to be measured. The 88 patients analyzed included 60 males (68%); age range 11 days to 75 years. Cranial surgery was for trauma in 42% and for brain tumour resection and other cranial procedures in the rest. The drain output ranged from 40mls to 960mls and was in place for an average of 3 days. There was 1 episode (1.1%) of drain dislodgement; 3 of drain blockage (3.4%) and 5 cases (5.7%) of wound complication post drain removal. All wounds healed with primary intention otherwise.***
Conclusions: ***The Uribag is an effective, very cheap, and complication-free, closed tube wound drain substitute for cranial surgery.***
Keywords: postsurgical wound drain substitute, developing country, craniotomy, neurosurgery, Uribag

Introduction

For perioperative closed tube surgical wound drainage, custom-made wound drain materials like the Jackson-Pratt's (Cardinal Health, Dublin, OH, USA) are not readily available in low-resource surgical practice areas of the world like Nigeria[1]. They are actually also too expensive for everyday use in such real-world surgical practice. Substitute materials that are more usually resorted to include nasogastric feeding tubes (NGT) and intravenous line sets (IVL). The simple urine bag appears to be not so popular for this purpose but we have found it to be actually more practically suited for this. It is so cheap and readily available. It is a unitized tube-and-reservoir system which we have found so user-friendly since we intuitively adopted it in the last couple of years as our de-facto wound drain material in our neurosurgical practice. In this paper we present an outcome analysis of its use over a 4-year period in a prospective consecutive patient's cohort.

Patients and Methods

Firstly, we present an annotated technical description of the use of the Uribag as a closed tube wound drain in cranial surgery. This is similar to the technique published earlier by another group of workers for extracranial surgery[1]. When ready to insert the wound drain following intracranial procedures, the blue tip of the drainage tube of the Uribag is cut off (Figure 1a). Fenestrations are made along the distal length of this tube as appropriate for the length of the cranial wound to be drained (Figure 1b). This end of the tube is then passed into the surgical bed via a separate stab wound (Figure 2a). The stab wound for the exit of the drainage tube itself is first secured with a Z-string suture of monofilament #00 nylon or prolene. The tube is then anchored to the scalp with another stay suture of monofilament.

The effluent valve at the distal end of the drainage bag reservoir is emptied daily of its content. This is then measured with separate calibrated tubing. The drainage bag itself is calibrated, but our practical experience is that this calibration does not reflect the accurate measure of its contents. The drain is removed post operatively when it ceases being active with no evidence of subcutaneous collection. The drain exit point on the scalp is then secured close by knotting the Z-string monofilament suture earlier placed intraoperatively. To maintain patency before its removal, the drain needs regular, daily milking of its tubing to free the clots.

We began using this technique in the year 2008. Here now we present a 4-year prospective cohort study of its outcome in a consecutive series of patients. The clinical data of these patients were gathered prospectively using a pre-designed proforma. These were later entered into an electronic spreadsheet. We determined the patients' relevant clinical demographics vis a vis the respective surgical procedures. The primary outcome measure was the effectiveness or otherwise of the drain performance, and, the profile of complications ensuing thereof. Secondary outcome measure was the final in-hospital (and at follow-up) clinical status of the patient as either good or poor on the dichotomized Glasgow outcome scale, GOS.

The statistical package for the social sciences (SPSS) version 16 (SPSS Inc. Il, USA) was used for the statistical analysis. We present categorical variables in sizes, frequencies and proportions, and continuous variables as means (±SD). Associations between the former were explored with the chi-squared (Fisher's exact) test, and the former with the student-t test. A p-value < 0.05 was deemed statistically significant.

Results

The technique was used in 107 patients over a 4-year period from September 2008 till October 2012. Nineteen of these were excluded from this analysis because they died too soon perioperatively for the drain performance to be measurable. This left a total of 88 patients eligible for this outcome analysis. There were 60 males (68.2%) and 28 females (31.8%) aged 11 days- 76years (Figures 2c, d), median 35, mean 33.38(±17.67).

Table 1. The types of cranial surgery following which the urine bag was used as wound drain

Surgical Procedure	Number (%)
Craniotomy for trauma	
Decompressive craniectomy	27 (30.7)
Other trauma craniotomy	15 (17.0)
Craniotomy	
Skull base surgery: tumours and other lesions	
Other brain tumours	24 (27.3)
Other intracranial diseases	14 (15.9)
	08 (9.1)

Figure 1

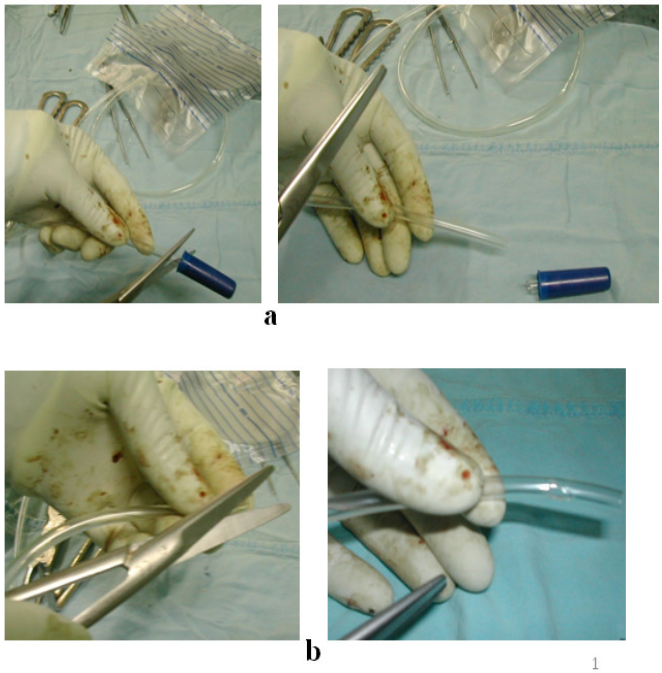

Figure 1. *Preparation of the Uribag as a surgical wound closed tube drain: (a) the bulbous tip of the drainage tube is cut off (b) fenestrations are made for wound drainage'*

Figure 2

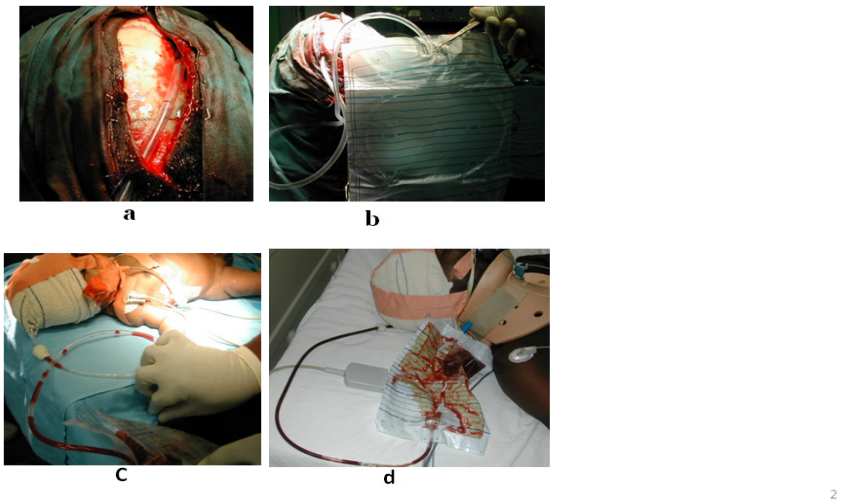

Figure 2. *Drain insertion and postoperative function: (a) the tube drain is introduced into the surgical bed via a separate stab incision (b) the unitized tube-and-reservoir system (c, d) the drain in use perioperative both in a child and an adult, respectively.*

The indications for surgery were for brain trauma in 53 (60.2%), brain tumour resection in 24 (27.3%) and other conditions like infections, repair of congenital malformations in 11 (12.5%) patients. Table 1 shows the specifics of the cranial surgery involved: craniotomies for tumours and other conditions, but, especially decompressive craniectomy (Figure 3) and other craniotomies for brain trauma.

Four complications (4.5%) were recorded with the drain in use: one case of dislodgement and three of blockage. In all there were only 5 cases of wound complications (5.7%) in this cohort of patients: 2 of persistent subgaleal collection following discontinuance of the drainage tubes and 3 cases of superficial wound infections. These however resolved following routine care involving no further surgical interventions. Because the complication rate has been so minimal statistical tests did not reveal any clinically significant associations. Finally, the in-hospital outcomes of these patients on the GOS were 5 severe deficits (5.7%), 30 moderate deficits (34.1%) and 53 normal (60.2%). In other words the good versus poor outcome rates in this patient series were 94.3% versus 5.7%. Seventy three (83%) of these patients have now been followed up for a period of 1- 36 months, mean 8.04 (±7.48). There has been no new wound complication recorded to date.

Figure 3

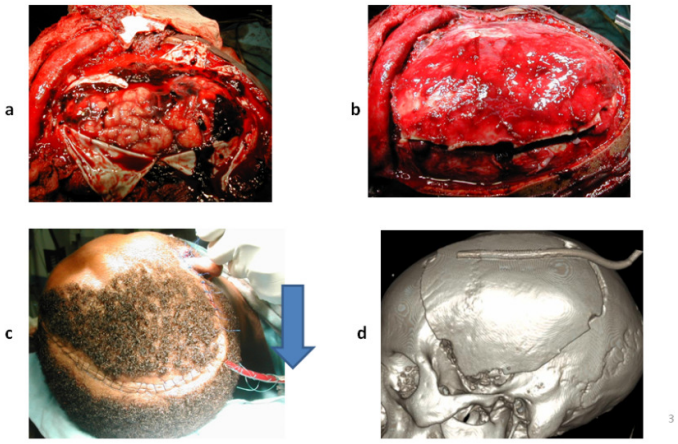

Figure 3. The Uribag wound drain following a major scalp dissection in a case of hinged decompressive craniectomy procedure using the temporalis muscle (14): (a, b) extensive scalp and intradural dissection with potential for postoperative surgical bed significant wound collection (c) the surgical site wound drain inserted at scalp wound closure, arrow (d) postoperative 3-D reconstructed image of the cranial CT scan showing the wound drain in-situ.

Discussion

Some controversy still surrounds the need for routine prophylactic drainage of surgical wounds in the surgical literature[2-6]. Nonetheless, there are certain surgical procedures where it would still be the intuitive thing to do[3,7,8]. One such situation might be in cranial surgery with extensive scalp flap elevation without air-tight dural closure[7,9]. Again, one ready neurosurgical example, among many others, that eminently qualifies for that is the acute-care, damage-control surgery of decompressive craniectomy (Figure 3).

This study showed that the simple readily-available urine bag, a unitized tube-and-reservouir drainage system (Figure 2b, d), is an effective substitute tool for this function in an otherwise impoverished surgical practice. It proved effective in at least 95% of 88 cranial surgeries performed by a single surgeon over a 4-year period. There was only few and minor, drain/wound complications recorded.

The urine bag as closed tube surgical wound drain

The Uribag, needless to add, given its name, is primarily a urine drainage system. But its unitized tube and reservoir design has since made it a utility drainage appliance for other body effluents like, for example, in closed thoracostomy tube drainage [10-13]. We are aware of only one other scientific report documenting its use as a substitute closed tube wound drain. This was however a general surgery-gynaecology surgical series[1]. In our empirical experience, the main closed tube wound drain substitutes that we see in use in our low-resource practice area include the NGT and IV line tubings.

In low-resource surgical practices like the authors', the main attractions to the simple Uribag, as well as other materials listed above, as substitute wound drain include its ready availability and affordability. A unit costs only about 100 naira (local Nigerian currency, or about 60 US cents, 2013 value). The competing substitutes like the NGT and IVL are however not as user-friendly as the Uribag. They are merely tubes sans reservoirs. Drainage receptacles still have to be sourced for them from materials like empty IV fluid bags/bottles. Even so, one still needs to address the problem of connecting the one to the other at surgery. This can many times be a complicated matter. There are simply no versatile connector materials easily available, all the time, to solve this problem. And finally, there is also the problem of the messy and contamination-prone manoeuvers that are necessary for the periodic emptying and measuring of the drainage output.

The unitized tube-and-reservoir system of the Uribag is free of many of these hassles. What is more, there is a unidirectional flutter valve at the junction of the tube and reservoir bag of this system assuring non-return of the drainage contents [3,13]. And for the emptying and daily documentation of the drainage output, there is an exit valve at the dependent part of the drainage bag that is easily opened and closed.

In short this simple system appears to be just tailor-made for the purpose of closed tube wound drain whenever there is that surgical need perioperatively in low-resource practices.

Pearls and Pitfalls

There are a few, quick ones. Firstly, and like all closed tube wound drains, the drainage tube of this system should be introduced into the surgical bed through a separate stab wound so as not to compromise the healing process of the main surgical wound [3]. And that extra wound, the exit stoma of the drain tube, should be secured following drain removal with an intraoperatively placed purse- or Z-string suture to prevent oozing and surgical bed contamination from that site. Furthermore, the drainage tube needs daily, even periodic attention to monitor for its blockage by blood clots or other accretions. This is easily prevented by daily/periodic milking of the tube length to dislodge any organizing / solidifying contents [10, 11].

Conclusions

Conventional custom-made surgical wound closed tube drains are not readily available in Nigeria and other low-resource practice areas of the world. Of all the common cheaper substitutes, the simple, unitized tube-and-reservoir system of the Uribag appears most user friendly. Its use for this purpose in 88 consecutive patients in a Nigerian neurosurgical practice has been presented in this 4-year prospective cohort study. The Uribag was found indeed to be an effective, cheap, readily available, and user-friendly closed tube surgical wound drain substitute in this study.

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