

FEATURE ARTICLE IN FOCUS

'The left behind syndrome'—surgical equipment errors in plastic surgery

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Introduction

In my early surgical career, an operating theatre in a major but very old Sydney teaching hospital was being converted into another use. While the builders were working on the very high gabled ceiling, an instrument called a *bistoury* was discovered in the rafters. Recognising its antiquity, the opinion of a very old retired nurse, who was still living in the nursing quarters, was sought. She identified the cause immediately as happening in the 1920s, when an irate surgeon threw the instrument in the air, only for all present to witness its almost miraculous disappearance! No doubt explaining the instrument count was a problem.

The phrase 'left behind' has become well-known in the world of religion, literature and film. Perhaps the most well-known is the 1995 book *Left Behind* by Tim LaHaye and Jerry B Jenkins,¹ which dramatises a nightmarish Dispensationalist interpretation of parts of the Bible book of Revelation.

However, for surgeons and nurses, the phrase can mean an entirely different nightmare...that of the accidentally-retained surgical swab or instrument after surgery. This has been the subject of numerous peer-reviewed articles, perhaps the largest number being in nursing journals. A retained surgical item is classified as a 'sentinel event'. The World Health Organisation (WHO) has determined this to be a considerable burden, affecting at least 0.001 per cent of the over 300 million annual worldwide surgical procedures.² The real incidence is likely to be very much higher; Brown and colleagues estimated the incidence in the United States (US) to be 1 in 1500 cases.³ Australia's 2020 rate for a foreign body left behind after a procedure was 7.6 per 100,000 separations, higher than the Organisation for Economic Co-operation and Development (OECD) average of five.⁴ Between 2012 and 2019 Australia had an annual rate of 22–34 cases of retained items.⁵ The majority (48–69%) of retained material consists of cotton gauze surgical swabs.⁶ However, incidences for plastic surgery cases do not appear to be available.

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A surgical item may go missing during a procedure, be considered lost, even before completion of the procedure, or be notified at the end of a procedure, when an item count finds a discrepancy. A retained item occurs when all efforts to locate a missing item fail, but the item remains in the patient after the procedure.

Retained surgical swabs, instruments, needles and other pieces of paraphernalia used in surgery have implications from the surgical macro world to the micro one. Perhaps the commonest number of cases occur in the charged atmosphere of emergency obstetrics,⁷ but even in ophthalmology,⁸ where 'things tiny' may still be lost, the problem is widespread, even if supposedly rare.

Discovering just how rare isn't easy. Cases that end up in court reflect only a tiny minority of the actual incidence, as many affected patients do not take action. Of those who do, at least 95 per cent of cases are settled outside the court system via the indemnity insurance systems in Australia and the US.⁹

There are numerous risk factors and red flags associated with errors that result in unplanned retained material, with variations occurring across a wide range of disciplines.¹⁰ The eventual discovery of a retained piece of surgical equipment may take years, or it may be discovered through the development of serious complications or even death.

That plastic surgery is not immune from this issue is accepted by all of us with long experience in our field. However, other than the rare case report,¹¹ there is a marked paucity of mention of these complications in the plastic surgical literature.

Before the invention of radiopaque inserts in sponges in 1929¹² and the Raytec gauze swab in 1944,¹³ the postoperative detection of a retained gauze item was nearly impossible. Moreover, routine intraoperative X-rays for potentially lost items have their own risks.¹⁴

Modern surgery has evolved to improve patient safety, but paradoxically, certain of those changes may have increased the chances of the left behind syndrome. That modern plastic surgical practice may have added complexity to this area is one of the themes of this article.

Plastic surgical procedures at risk

Anecdotally, the most common items that can be left behind after plastic surgical procedures are similar to those from most surgical disciplines, ranging from large sponges to Raytec gauzes, needles, and surgical instruments.

Some plastic surgical procedures, such as abdominoplasty, breast reduction, breast augmentation, breast reconstruction and some large body-contouring procedures, involve wide undermining of tissues where the unnoticed leaving behind of a small swab is easily possible. Some procedures are very long, such as microsurgical reconstruction using free flaps. Some are long because of multiple areas of surgical approach, such as combined lipectomies of several body areas. Long procedures, especially emergencies and late night starts, are fraught with the danger of surgeon and nursing staff tiredness, resulting in fading attention and sometimes frayed nerves, neither of which is conducive to an obsessive approach to patient safety. Yet another risk area in plastic surgery is when a body cavity is involved, such as the nose and oropharynx, places where a retained gauze pack can easily be overlooked.

One area of increasing risk is the combined surgical procedure, where two or more surgical teams participate, sometimes *seriatim*, sometimes simultaneously, or with varying degrees of time overlap. Therein lies the question of who is ultimately responsible for errors, in particular, for the unplanned retention of surgical equipment. Plastic surgeons are commonly involved in such procedures, especially in breast reconstruction, head and neck cancer surgery and other oncological procedures, when an immediate reconstruction is necessary.

Operating room practice

Some of the more modern changes in operating room practice that may have a two-edged sword to them are discussed below.

Modern surgical draping and gowning

In the last 30 years or so, linen surgical drapes have been largely replaced by adhesive paper-based patient drapes. Despite the obvious problems with disposal, they are now almost universal. Their advantages include the ability to better isolate the sterile surgical field and a reduction in hospital laundry costs.

However, the adhesive in the drapes, especially if incorrectly used, may inadvertently attach to items such as Raytecs, smaller swabs like pledgets or threads attached to needles, and cause loss of those items when the drapes are too hastily removed. The same applies to self-adhesive strips on surgical gowns. I have witnessed a Raytec attach itself to a surgical gown and leave the theatre that way, with the wearer of the gown.

Interim counting in multidisciplinary procedures

When two or more surgical teams are present in an operating theatre (simultaneously, overlapping in time or one following the other), there is potential for one team to leave behind a swab or other implement, which may go unnoticed by the incoming surgical team, such as the plastic surgeons. It is evident that hospitals may vary how they deal with count issues, especially of swabs, in that interim between team changeover. The gold standard is for an interim swab, instrument and needle count to be completed in the changeover period. However, surgeon impatience not infrequently prevents proper procedure. Some hospitals may not mandate such a procedure.

Not doing an interim count increases the risk that there will be a swab left behind, which itself may significantly extend the time-length of the procedure, when an incorrect count call is made at the very end of a long procedure.

End-of-procedure incorrect count protocol

Standard procedure is for the involved nursing staff, supervised by the chief scrub nurse, to repeat the count at least twice with one or more other trained staff members. Common errors include two swabs clinging together, especially if heavily blood-stained. Cutting a swab in two or removing the radiopaque ribbon are banned and are considered dangerous manoeuvres.

Lost swabs may well have fallen on the floor or between the patient and drapes. That requires a diligent search, on hands and knees if necessary, plus a search of all disposal bins in the theatre, even those that may have been removed during the surgery (a practice that should be condemned). Careful searching between patient and drapes may be required, including moving the patient, when necessary, while still anaesthetised. There are almost no circumstances where the patient should not be kept anaesthetised, until the lost item is found, as immediate reopening of surgical wounds may be necessary.

Hazards of the end-of-procedure X-ray

When an incorrect count is made at the end of a procedure, and double and triple counting still shows a missing item, standard procedure is to X-ray the operative site. This is usually done with X-ray plates being placed in the X-ray slots of the operating table. Misplacement of an X-ray plate that misses part of the operative field can lead to a false negative finding.

On occasions, particularly in orthopaedic or hand surgery cases, an image intensifier may be used, which can be quicker.

Microsurgical needles are a particular problem, as some are so fine as to be virtually invisible on X-ray. It has been accepted that the risk of danger from very small needles is such that a lost microsurgical needle does not generally justify an X-ray to find it.¹⁵

Legal responsibilities

The legal responsibility for retained surgical items has had a seesawing history. Some of that has come from the evolution of the 'captain of the ship' doctrine [1949 US court case of *McConnell v Williams*],¹⁶ which placed all ultimate responsibility on the operating surgeon, to a wider approach, which acknowledges that modern surgery is a team effort. Each member of the team takes certain responsibilities for their part.

In Australia, the main reason why such cases end in court, rather than with a mediated settlement, is because of disputed liability between the parties present at the incident. It is common legal practice for the litigant's legal team to sue all potential parties to the claim, leaving the court to adjudicate liability. In the 1990 case of *Langley and Warren v Glandore Pty Ltd and Thomson*, when a sponge was retained intra-abdominally, the principal surgeon was held liable by a jury. However, the finding was reversed on appeal in 1997. The private hospital, who employed the nurses involved, was ordered to pay AU\$527,000 plus costs to the plaintiff. A similar case of a retained swab (*Elliott v Bickerstaff*, 1999), initially found the surgeon liable, but again a court of appeal reversed the verdict.⁹

The current standards for perioperative nursing in Australia produced by the Australian College of Perioperative Nurses (ACORN) in 2023 state that the instrument nurse must:

'2.1.6 conduct a baseline count, maintain an accurate count, and document all accountable items **throughout the procedure** to prevent unintended retention of a foreign object' (emphasis added).¹⁷

According to NSW Health Policy Directive PD2023_002 *Accountable items used in surgery and other procedures*:

'An incident involving the "unintended retention of a foreign object in a patient after surgery or other invasive procedure resulting in serious harm or death" is to be managed as an Australian Sentinel Event as per the NSW Health Policy Directive Incident Management (PD2020_047).

The instrument nurse/midwife is responsible for ensuring the count sheet is complete and accurate. The circulating nurse/midwife is responsible for documenting the count.

The count sheet and documentation of the instrument count must be part of the patient's medical record.

A minimum of two counts must be performed. When the initial count starts all accountable items and waste must remain in the operating/procedure room.¹⁸

Principles for prevention of lost and retained items

Answers to preventing these potential disasters are multifactorial. They involve such things as hospital policy, the division of staff responsibilities, the acceptance of individual responsibility, the communication skills of all staff involved in surgery, and an obsessive approach by all to patient safety.

The prevention of mishaps and sentinel events in the operating theatre is a divided responsibility. The team approach requires close co-operation between surgical teams, anaesthetic teams and nursing staff. Sometimes it may involve those of other disciplines, including radiographers and equipment technicians.

Staff attitudes

The success of procedures depends as much on other issues as technical expertise. Some of these other issues are personality-based.

There is no place for blasé attitudes in operative procedures. No procedure is too small not to have undivided attention. It is jokingly said that minor surgery is often performed by minor surgeons. However, there may be major consequences, even in minor surgery.

Distractions during critical times should be avoided. Some staff are distracted by background music, others not. This should be taken into account.

Nursing staff are an essential part of procedural work and should be listened to and respected.

Likewise, operating room nurses need to understand the clinical responsibilities of the doctors involved, something that some may not appreciate, due to a lack of personal experience with patients.

Some notable legal cases involving retained surgical items have resulted in recrimination between surgeons and nursing staff with disastrous personal consequences. This is not helpful in any moves to improve the statistics.

The count

The Australian College of Perioperative Nurses (ACORN) have training courses and a range of standards applicable to all aspects of operating theatre practice. In their July 2021 online answer to questions about 'The count: Who can, who can't and who should', they state:

'Within ACORN's response and in the Accountable items standard ACORN notes that where contradictory recommendations exist in additional national or jurisdictional directives, including legislation, public policy or guidelines, those recommendations take precedence. ACORN's responses routinely include the caveat 'the ACORN Standards for Perioperative Nursing in Australia are voluntary documents that set out specifications, procedures and guidelines that aim to ensure products, services and systems used in perioperative nursing are safe, consistent and reliable.'¹⁹

Whether hospitals and State health authorities adhere to these standards through their policy directives, staff accreditation processes and ongoing training programs is a matter for each health authority, it would seem.

According to NSW Health Policy Directive PD2023_002, in NSW at least two instrument/item counts are mandated in every procedure. Additional counts are also mandated when body cavities are closed after being entered, when starting skin closure, when the instrument nurse or midwife is permanently replaced, and also at the discretion of the nurse or midwife performing the count or the surgeon.¹⁸

This policy can be applied to interim counting, when two or more surgical teams enter and leave the operating room. However, its mandating may not apply in all circumstances and in all State health jurisdictions. Here is a potential for mishap to occur.

The counting of surgical items is the responsibility of the scrub nurse in charge. Distractions to this process must be avoided, as the undivided attention of at least two people is required. This applies to the preoperative, intraoperative (if performed) and end-of-procedure counts.

Surgeons should assure themselves that the preoperative count process is satisfactory. Any unsatisfactory count should be repeated. The reporting of an incorrect count to the surgeon at any stage should be taken seriously and all possible measures to ensure that an item has not been misplaced should be directed by the surgeon.

There is a 'catch 22' conundrum with counts, too. Whenever a count is found to be correct, we always relax and assume that that is so. But a correct count is no more likely statistically to be correct than an incorrect one!

To expedite the procedure, experienced scrub nurses will often begin the end-of-procedure count of certain items well before wound closure. This is only wise when items cannot be retained in a wound, either by being physically excluded from re-use or are recounted after wound closure. So, a correct count should be repeated as often as an incorrect one.

Physical countermeasures

Adhesive drapes should be applied carefully and wherever possible, properly sealed against the patient's skin to prevent slippage of items between the surgical field and the patient's body. Common places for this to fail are the pubic area and axillae. No adhesive should be left exposed that could attach to a surgical item, especially a suture attached to a needle.

Surgical gowning should not expose any adhesive on the gown that could cause adherence to an item.

Sponges usually have a loop attached. Having an artery forceps or similar instrument attached to the end of the loop is an additional safety measure in some circumstances. Leaving Raytec swabs attached to a forceps may also assist in retrieval.

Wound closure

In order to minimise scars, plastic surgeons have embraced some newer wound closure techniques, such as subcuticular absorbable closure, but tended to avoid others, such as metal skin staples. The main risk there is for the retention of surgical needles, especially in deeper layer closure. Long threads on used needles may catch in other items and be 'flicked' out of the operating field. The trimming-

short of long suture threads after use is a common practice by some scrub nurses, which reduces that risk. The use of adhesive or magnetic needle tidies is another safety technique. Magnetic wands are used in some theatres to find lost needles on the floor.

Dressings, packs, splints and drains

Packs and splints left in situ may migrate. A common example is the Doyle nasal splint, whose shape encourages it to migrate backwards in the nasal cavity, which can lead to prolonged unintended retention, as it will not be seen easily. Placing a suture in the splint and taping the suture to the cheek skin should prevent that.

Drains inadequately anchored to the skin may break and migrate deeply.

Postoperative dressings may inadvertently cover a retained item, commonly a needle.

Radiography for retained items

An incorrect end-of-procedure count leads to a range of procedures outlined above. It is the responsibility of the surgeon to ensure that X-ray plates are properly placed under all areas where surgery has occurred. That responsibility should not be left to the radiographer. When an end-of-procedure incorrect count is notified, if the surgical team unscrubs while awaiting an X-ray, they should leave their gowns inside the theatre to be checked.

Conclusion

Despite the implementation of policies and procedures aimed to prevent the preventable, the issue of the accidental retention of surgical items in patients' bodies is still an issue of great personal cost to some patients and to medical and nursing staff the world over. The financial burden is also substantial and is an ongoing issue that hasn't gone away.²⁰

In virtually all surgical disciplines there are lessons to be learned here, especially by trainees. The field of plastic surgery is no exception.

If I could paraphrase Thomas Jefferson, 'The price of freedom (from personal angst and court action) is eternal vigilance.'

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