

The Missing Suction Tip

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Case Objectives

- Identify the risk factors for retained foreign bodies.
- Understand methods used to prevent and identify retained foreign bodies.
- Appreciate the role of teamwork and communication in errors of this type.
- List the specific system failures that can lead to communication breakdown.

Case & Commentary: Part 1

A 65-year-old, 124-kg man with aortic stenosis and coronary artery disease underwent a combined aortic valve repair and coronary artery bypass grafting. The patient's surgery, scheduled as the second case of the day, began in mid-afternoon. The surgery was complicated by a prolonged time on bypass, totaling 7 hours after incision. During the post-bypass period, the scrub nurse noticed that the removable, small (1 cm), round metal tip of the surgical suction catheter was missing. He notified the surgeon. The surgeon replied, "You'll find it on your table somewhere," and continued to attain hemostasis and close.

The nurse searched frantically without success. He recalled that the tip had been causing problems by clotting earlier in the case, preventing adequate suction. He surmised that it must have been removed at that time. He theorized that the tip had found its way into a basin of saline that was then, much later, inadvertently used to irrigate the open wound. The nurse notified the surgeon that he believed the suction tip catheter was inside the patient.

Missing suction tips and other items left in body cavities during surgery are often called "retained foreign bodies." Case descriptions of retained foreign bodies appear with regularity in the popular press (1), and may result in substantial complications and death.(2) Unfortunately, their true incidence is unknown. Risk factors include emergency surgery, an unexpected change in a surgical procedure, and higher body mass index.(3) Because retained foreign bodies may cause death, bowel perforation, sepsis, repeat surgery, and malpractice litigation, there are recommended practices for counting sponges and instruments.(4) However, 88% of retained foreign bodies occurred in the setting of a final count that was mistakenly

thought correct.(4)

Case & Commentary: Part 2

In preparing to close, the surgeon quickly searched the chest cavity but did not find the suction tip. The anesthesiologist suggested an x-ray be obtained before closing the chest. However, the surgeon felt that the risk of the tip being in the chest was low and decided to defer the x-ray until after the chest was closed.

If a retained foreign body is suspected, surgical teams should consider rechecking sponge and instrument counts, manually searching the surgical site, and ordering an intraoperative radiograph.(5) Some authors suggest routine intraoperative radiographs after all high-risk procedures, regardless of the surgical team's suspicion of a retained foreign body. Because neither routine sponge counts nor intraoperative radiographs have been tested in prospective studies (6), the standard of care remains unclear.

Case & Commentary: Part 3

A post-operative x-ray confirmed the tip was somewhere inside the patient's chest. The patient was taken back to the operating room for removal of the tip. The re-exploration required that the patient go back on cardiopulmonary bypass, receive several additional units of blood products, and remain in the operating room for at least 6 additional hours. Luckily, however, there were no long-term adverse sequelae.

What went wrong in this case? The patient's weight is a risk factor clearly identified in the medical literature.(3) Other possible risk factors (although not conclusively identified by research) include the complexity and duration of the case, along with provider fatigue (since it was an afternoon case). An intraoperative x-ray likely would have detected the suction tip. Perhaps the surgeon believed it was more important to end the operation than to wait for an intraoperative radiograph. At times, this line of reasoning may be correct—in many institutions, the wait can be long enough to have negative clinical implications for the patient. If so, this error may actually have resulted from actions taken by a single individual (the surgeon) to compensate for other problems in the broader work environment.

Another interesting contributing factor featured prominently in this case is the communication among the team members. Research in aviation and other industries has illuminated the importance of communication and teamwork for preventing and managing errors in demanding environments. The aviation experience has also highlighted the contributing factors that lead to teamwork and communication breakdowns. Analysis of this case in light of this experience provides additional insight into what went wrong.

The information provided does not allow definitive interpretation of the communication between the nurse, the surgeon, and the anesthesiologist. Perhaps the surgeon doubted the nurse's suggestion that the tip was in the chest cavity, and thus at the end of the case did not follow the anesthesiologist's advice to obtain an intraoperative radiograph. It is possible that the surgeon was not listening to the advice of other team members, or, although he heard the advice, he was perturbed that his judgment was questioned. One study that used a survey adapted from the aviation industry supports such an interpretation: 40% of surgeons surveyed believed that junior team members should not question decisions made by senior team members.(7) A broader and related issue reflected in this survey was that almost 40% of surgical nurses

rated the quality of teamwork and collaboration with surgeons as low.

Alternatively, the nurse may have communicated poorly. Did he clearly and directly say, "I am very concerned that we left the catheter tip in the chest cavity—we should look for it"? Or did he raise ambiguous questions like, "Has anyone seen the catheter tip?"; "I wonder where the tip is"; or "I hope we have everything"? Such indirect comments may not have raised suspicion even in a surgeon open to questioning by other team members.

The observable communications and actions of this team can be a focus of improvement efforts, but they should also be viewed as symptoms of problems in the broader operating environment. This lesson has been learned from years of research on human performance in aviation and other industries.⁽⁸⁾ When investigating and analyzing this event, the goal should be not only to identify the communication problems but also to understand *why* the surgical team's communications and actions made sense at the time.

What lies behind communication breakdowns like this one? Based upon research and accident investigations in aviation and other industries, at least four broad system failures can lead to communication breakdowns:⁽⁹⁾

- differences between team members' goals;
- differences between team members' interpretation of events (nurses and physicians interpret situations differently);
- knowledge that did not make it into the team consciousness (due to fear of speaking up or if one person assumes that others have the same knowledge they have); and
- other features of the operating environment (noise, lighting, new equipment, or technology).

Root cause analyses are often used to identify such "system errors" in hospitals. Other complementary methods elicit participants' understanding of an event and also help identify factors in the broader environment that influenced their thinking and behavior.⁽¹⁰⁾

Once these system errors are identified and corrected, it still may be necessary to focus on teamwork and communications. This is an interest of many patient safety researchers due in part to the success of aviation's Crew Resource Management (CRM) programs ⁽¹¹⁾ and other efforts to understand and improve teamwork.⁽¹²⁾ Efforts are currently underway to identify the team-related behaviors that are important in health care. Researchers have identified behaviors relevant to this case—for example, information sharing, inquiry, and assertion—that may help reduce and manage medical errors such as retained foreign bodies.^(13,14,15)

Unfortunately, only one study has examined the effectiveness of CRM-like programs in real work environments (as opposed to simulators).⁽¹⁶⁾ Therefore, it is premature to recommend comprehensive CRM training programs for health care providers. Other focused efforts to improve teamwork are showing promise. These include the use of daily goals (all providers on the team agree upon the goals for the patient each day) ⁽¹⁷⁾ and collaborative rounds.⁽¹⁸⁾

Cases of retained foreign bodies should be thoroughly analyzed to identify communication breakdowns in the operating room, as well as the broader operating room environment and system factors that led to the event.

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