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Natural history of retained surgical items supports the need for team training, early recognition, and prompt retrieval

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Abstract

BACKGROUND: Unintentionally retained items feature prominently among surgical "never events." Our knowledge of these rare occurrences, including natural history and intraoperative safety omission or variance (SOV) profile, is limited. We sought to bridge existing knowledge gaps by presenting a secondary analysis of a multicenter study focused on these important aspects of retained surgical items (RSIs).

METHODS: This is a post hoc analysis of results from a multicenter retrospective study of RSIs between January 2003 and December 2009. After excluding previously reported intravascular RSIs (n = 13), a total of 71 occurrences were analyzed for (1) item location and type; (2) time to presentation and/or discovery; (3) presenting signs and symptoms; (4) procedure and incision characteristics; (5) pathology reports; and (6) patterns of SOVs abstracted from medical and operative records. These SOV were then grouped into individual vs team errors and single- vs multifactorial occurrences.

RESULTS: Among 71 cases, there were 48 women and 23 men. Mean patient age was 49.7 ± 17.5 years (range 19 to 83 years). Mortality was 4 of 71 (5.63%, only 1 attributable to RSI). Twelve cases (16.9%) occurred at nonparticipating referring hospitals. Most RSI procedures (62%) occurred on the day of hospital admission. The median time from index RSI case to retained item removal

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was 2 days (range <1 to >3,600 days, n = 63). Abdominal RSIs predominated, and plain radiography was the most common identification method. Most RSIs removed early (<24 hours, n = 23) were asymptomatic. The most common clinical/diagnostic findings in the remaining group were focal pain (n = 22), abscess/fluid collection (n = 18), and mass (n = 8). Most common pathology findings included exudative reaction (n = 22), fibrosis (n = 17), and purulence/abscess (n = 15). On detailed review of intraprocedural events, most RSI cases were found to involve team/system errors (50 of 71) and 2 or more SOVs (37 of 71). Isolated human error was seen in less than 10% of cases.

CONCLUSIONS: The finding that most operations complicated by RSIs were found to involve team/system errors and 2 or more SOVs emphasizes the importance of team safety training. The observation that early RSI removal minimizes patient morbidity and symptoms highlights the need for prompt RSI identification and treatment. The incidence of inflammation-related findings increases significantly with longer retention periods.

Unintentional retained items feature prominently among the surgical "never events" or adverse clinical occurrences that are broadly considered unacceptable and felt to be totally preventable.[1] Details regarding natural history and intraoperative events related to retained surgical items (RSIs) remain limited and only consist of clinical reviews, case series, and isolated reports.[1–7] This study aims to answer many of the outstanding questions regarding clinical signs, symptoms, diagnostic evaluation, anatomic locations, and intraoperative characteristics associated with RSIs.

Methods

This report represents a post hoc examination of data from a 7-center retrospective study of RSI. Original data for 84 RSI cases were abstracted from January 2003 and December 2009. After excluding previously reported intravascular RSIs[6] (n = 13), a total of 71 RSI occurrences were analyzed for (1) item location/type; (2) time to presentation/discovery; (3) presenting signs/symptoms; (4) procedure/incision characteristics; and (5) surgical pathology reports. These 71 occurrences include both RSI that occurred in participating centers and RSI that occurred at nonstudy hospitals that were surgically removed at participating study hospitals during the study period. Inherent to the nature of the current report, some of the data used in this study overlap with data previously reported in our initial study of RSI risk factors,[8] although the scope and focus of the aforementioned manuscript[8] did not include the majority of the data included in the current report. Appropriate annotations are placed throughout the text whenever an overlap exists with any previously published data. For the purposes of describing the time between the index RSI procedure and the identification of the retained item, the following definitions were used: "immediate" (within 24 hours), "acute" (>24 hours to 1 week), "subacute" (between 1 week and 6 weeks), and "chronic" (>6 weeks).

Intraoperative safety omissions or variances (SOVs) were abstracted from patient records (Table 1 and Fig. 1). In addition to reviewing their own institution's operative/perioperative records, each site reviewed previous operative reports for cases originating at other institutions. Occurrences were categorized as either individual or team/system errors and further grouped by the total known number of known SOVs per case. Isolated human error was defined as an error clearly attributable to single individual's actions. Team or system error was defined as a combination of (1) error not isolated to single individual actions; (2) error attributable to 2 or more co-associated SOVs; (3) error involving insufficient safety cross-checks/redundancy; (4) error involving lack of safety knowledge/education; and (5) errors in safety verification, documentation, or communication (if/when known).

Regarding procurement of specific event-related information, each occurrence was reviewed by the respective site investigator at every contributing institution before being transmitted to the central location. This process involved one or more of the following: (1) careful review of the medical record; (2) surgical quality or sentinel event query review, if available; (3) any other internal reports available on record (ie, anonymous complaints, etc); and (4) the presence vs absence and the observance of pertinent safety protocols, techniques, and/or other measures. Given the very nature of what information was available, the subjectivity involved, and the mode of abstraction, there is likely a significant amount of under-reporting. However, the authors postulate that despite this shortcoming, the present study provides unique insight into factors and/or events that may have led to RSI occurrences in this series.

For SOV category involving "RSI missed on imaging," all available information regarding the particular event were reviewed by each reporting site's principal investigator. Specific information sought during this process included (1) availability of any communication regarding "preliminary" vs "final" radiology interpretation; (2) any mention of radiographs being examined by the surgeon/surgical team; (3) any mention within the medical record (ie, operative nursing or surgical report) of radiography results being communicated to the operating room team; and (4) any available evidence from corresponding surgical quality/sentinel event queries, if available. Similarly, for the