

Surgical Resident Bedside Rescue Successes

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OBJECTIVE: Attempts at improvements in emergent bedside care of hospitalized patients is an ongoing process in many institutions. Recently, the development and role of rapid response teams has been well described in the literature. However, the role of surgical residents, who are typically not part of these “medical” teams, in emergent bedside care of patients, has not been well described in the literature. Surgical residents have been responsible for many bedside emergent “rescue successes,” in teaching hospitals. We present 11 instances of surgical resident bedside rescues over a 1-year period at Monmouth Medical Center as a means of emphasizing their critical role in reducing adverse events and even mortalities.

DESIGN: These cases were presented at our Morbidity and Mortality conferences and involved only surgical residents performing various technical maneuvers.

SETTING: Monmouth Medical Center.

PARTICIPANTS: The 11 cases are representative and do not include multiple central lines and do include 2 of many chest tube-related cases. There was no “failure to rescue case” that involved only the surgical residents.

RESULTS: Surgical bedside rescues included: an emergent re-intubation, 2 openings of neck incisions for expanding hematomas, replacement of a dislodged tracheostomy tube, rigid sigmoidoscopy for rectal bleeding, bronchoscopy for hemoptysis, control of a permacatheter bleed, control of a ruptured femoral-femoral crossover bypass, control of a bleeding tracheoinnominate fistula, and emergent placement of chest tubes.

CONCLUSIONS: Surgical residents possess bedside procedural skills beyond those of nonsurgical health care workers and rapid response members. These lifesaving skills are needed to reduce adverse events and even prevent mortalities in hospitalized patients. Bleeding complications and invasive procedures such as chest tube placement, venous cutdowns, and emergency endoscopy are situations where a surgical resident should be called first, in a teaching hospital. (J Surg 67:95-98. © 2010

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COMPETENCIES: Patient Care, Medical Knowledge, Practice Based Learning and Improvement

INTRODUCTION

Attempts at improvements in emergent bedside care of hospitalized patients are an ongoing process in many institutions. Recently, the development and role of rapid response teams has been stressed in the literature.¹ These teams typically include a critical care nurse, respiratory therapist, and intensivist. However, the role of surgical residents, who are typically not part of these teams, in emergent bedside care of patients has not been well described in the literature. Dimick et al. compared the outcomes of complex surgical procedures between teaching and nonteaching hospitals.² This study found lower operative mortality rates at teaching compared with nonteaching hospitals. The lower mortality rate, however, was explained by higher procedural volume. The role of the surgical resident in emergent bedside procedures was not mentioned. We present 11 instances of surgical resident bedside procedure “rescue successes” during 2008, and presented at our Morbidity and Mortality Conferences.

Although “failure to rescue” is a term used to identify poor outcomes, “rescue success,” the reciprocal measure, is clearly appropriate in the instances described herein.

These residents were on call in the hospital. Many of these patients would have died without surgical management delivered expeditiously by surgical residents.

METHODS

The surgical residents involved were at Monmouth Medical Center, a community teaching hospital with a free standing surgical residency program.

The data base of our Morbidity and Mortality conferences was used to extract the cases. The “rescue successes” were limited to in-hospital bedside procedures performed by a surgical resident.

These cases were presented at the weekly Morbidity and Mortality conferences. Intraoperative rescues by attending sur-

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geons were described in an article by Goldfarb and Baker.³ That type of rescue occurred when an attending surgeon was called into the operating room by another attending surgeon. These cases were also presented during Morbidity and Mortality conference and particular credit was given to surgeons who "dropped everything" to help other surgeons with intraoperative dilemmas or misadventures.

RESULTS

In 2008, 11 "rescue successes" by surgical residents were described. There were no failures to rescue with only a surgical resident present. The surgical bedside rescues included a variety of emergent bedside procedures performed by the surgical resident on call. Six were carried out by senior residents and 5 by junior residents. A brief summary follows.

The first patient had undergone a parathyroidectomy that morning. In the evening, the rapid response team was called by the nursing staff after the patient was found to be dyspneic and stridorous. The rapid response team placed the patient on a 100% nonrebreather mask, but the oxygen saturation was only 70%. The surgical resident was called to see the patient, and recognized the patient's stridor, dyspnea, and neck fullness. He immediately prepped and opened the parathyroid incision and evacuated a large hematoma. This maneuver led to immediate relief of the patient's stridor and dyspnea, and the oxygen saturation increased to 100%. The patient was soon after taken to the operating room for wound exploration and a bleeding vessel that caused the hematoma was ligated. The patient was discharged the following day and has not suffered any further complications since this event.

The next case involved a 51-year-old male who underwent an anterior cervical discectomy of C3-C4. The following morning, the patient had significant neck pain, swelling, and dyspnea. The dressing was saturated with blood. The following morning on routine rounds the patient was emergently evaluated by a surgical resident, who then evacuated the neck hematoma by opening the incision at the bedside. Active bleeding was present. The patient was transported to the operating room where he was intubated. A neck exploration by the attending surgeon and resident exposed a small bleeding arterial branch of the carotid which was ligated. The patient was then transported to the postanesthesia care unit in stable condition.

The next "rescue successes" involved 2 patients who underwent tracheotomies that became dislodged in the intensive care unit. The first patient was dyspneic and the oxygen saturation quickly dropped to 65%. The critical care nurse notified the surgical resident who was unable to replace the tracheostomy tube and, therefore, proceeded to intubate the patient. The oxygen saturation returned to normal and soon after, the patient had the tracheostomy tube replaced in the operating room. The second patient was obese, dislodged her tracheostomy and desaturated. The intensive care unit nursing staff and medicine residents who happened to be present were unable to reinsert it. The surgical resident was called. At the bedside the

tracheotomy tract was opened, and the tracheostomy tube replaced. Oxygen saturations returned to normal and the patient recovered.

In 2 separate instances chest tubes were placed in patients in emergency circumstances. In 1 patient, the chest tube relieved a pneumothorax. In the other patient the chest tube was inserted for a hemothorax after trauma. Both patients recovered without complication. At our hospital most emergent chest tubes are placed by surgical residents and not the emergency room physicians. Another pulmonary "rescue success" involved an 85-year-old female with lung cancer who had hemoptysis. The nursing staff contacted the on-call surgical resident who performed a bedside bronchoscopy and applied thrombin and gel-foam to control the bleeding.

The next case involved a 52-year-old male who had undergone a trans-anal biopsy of the prostate by a urologist. The patient was discharged home but returned later to the emergency room with dizziness and palpitations. The patient was hypotensive and tachycardic. He was admitted to the intensive care unit and started on pressors by his internist. At this time, the patient had copious bright red blood per rectum. The medical critical care team transfused 3 units of packed red blood cells and the hemoglobin increased to 8.3. However, the bleeding continued. The gastroenterologist on call was contacted for an emergent colonoscopy to stop the bleeding but he did not respond promptly. The surgical resident was then called emergently to the bedside. The resident immediately performed a rectal examination but the profuse bleeding made it impossible to identify the source. Therefore, a rigid sigmoidoscopy at bedside was performed and the rectum irrigated. This allowed visualization of the bleeding source approximately 6 cm above the anal margin at what appeared to be the biopsy site. A laparoscopic kitner with a small piece of gauze at the tip and gel-foam was passed through the scope and held directly on the bleeding site for 15 minutes. Within an hour, the vital signs normalized. The hemoglobin remained stable and there was no further bleeding.

Another patient had undergone tracheotomy 3 weeks earlier, and the nursing staff discovered profuse bleeding around the tracheostomy site. The nurse could not control the bleeding with pressure, and the surgical resident on duty was paged. He held pressure over a tracheoinominate artery fistula that controlled the bleeding. The patient was then emergently taken to the operating room for stent placement across the fistula. The patient recovered without further complication.

The next case involved a patient who presented to the emergency department (ED) with a broken permacatheter. The patient had a blood pressure of 70/40 and the ED staff held pressure with gauze pads over the bleeding catheter. This gauze pressure did not stop the flow of blood from the broken catheter. The surgical resident was called and clamped the catheter proximal to the broken section. The permacatheter was exchanged later that day in the operating room and the patient had no further complications.

In the final "rescue success," a 70-year-old female patient had undergone a femoral-femoral crossover graft 10 years ago. On

the day of the rescue, the patient had a femoral artery angiogram performed by an interventional radiologist. Later that evening, the patient began to bleed profusely from the angiogram needle insertion site. The nursing staff and medical residents were unable to control the bleeding, and the interventional radiology attending was not immediately available. A surgical resident was therefore paged, and arrived promptly. A quick evaluation revealed an erosion in the femoral-femoral crossover graft. Digital pressure over the graft defect controlled the bleeding. The patient was taken to the operating room for repair of the graft. The patient required 5 units of packed red blood cells, but recovered from this nearly fatal event.

DISCUSSION

These 11 rescues, carried out by surgical residents at the bedside, were all potentially lethal presentations. We feel that the term "rescue success" is better to describe the positive outcomes of emergent situations or complications. We are studying our "rescue success" rate of various postoperative complications. "Rescue success" is a more rewarding way of reviewing complication rescues rather than relating it to the reciprocal "failure to rescue." Numerous emergent central line insertions and cut downs are a part of the overall daily tasks of surgical residents and were not included in the study. Postgraduate year 1 through 4 surgical residents were involved in these rescues without an attending present because of the nature of the emergencies. In several cases, nonsurgeon health care professionals who were initially summoned were unable to remedy the patients' problems. The surgical resident was, therefore called for assistance. The rapid response team (RRT) at our hospital does not include a surgical resident and the RRT members defer surgical complications or conditions that require immediate surgical intervention to surgical residents. A surgical resident, however, is always available and part of the "code team." At our institution the RRT is summoned if any health care worker or family member is worried about the patient. The physiological variables also used as criteria include acute changes in: heart rate (<40 or >130), systolic blood pressure (<90 mm Hg), respiratory rate (<8 or >28 /minute), saturation ($<90\%$ despite oxygen), conscious state, and urinary output (<50 mL in 4 hours). We propose that issues that should be managed by surgical residents or attending surgeons include the need for an invasive procedure (such as chest tube or intravenous access), new wound complications (such as dehiscence), postoperative bleeding (wound, internal, or catheter-based), and dislodged or nonfunctioning drains, tubes or catheters. One of the messages of our report is to incorporate these patient issues into the evaluation of the RRT so that a surgical resident or attending surgeon is summoned.

The surgical resident should have an understanding of surgical complications and postoperative anatomy. The surgical resident therefore should be the first choice in dealing with these problems. For example, with regards to the tracheoinominate fistula, the knowledge of the inominate artery and the direc-

tion of the tracheostomy tube are keys to control bleeding. In the patients with the neck hematomas, knowing that the wounds can be readily opened was essential to relieve airway compression.

Hemostasis is a part of every surgical procedure, elective or emergent, and surgeons are trained to become skilled at bleeding control maneuvers. Thus, surgeons become experienced with control of external and internal bleeding.

All the surgical rescues mentioned are not rare events. Surgical residents should know how to diagnose and treat these surgical situations inherent to surgical training. There were no deaths, and no "failure to rescue." A study from Abbas et al reported incidence of reoperation for bleeding after thyroid surgery at 0.7% (6 out of 918 patients) and for parathyroid surgery 1.1% (4 out of 350 patients).⁴ Two patients in our study required emergent openings at bedside due to postoperative hematoma and worsening airway obstruction. Postoperative tracheotomy complications are also well known. According to a study by El Solh et al, residents should be particularly attentive to tracheotomy complications in the morbidly obese as 1 patient was also presented in this study.⁵ El Solh et al indicated obesity was independently associated with increased risk of tracheostomy-related complications. Of 89 morbidly obese patients who had a tracheotomy, there were 27 (25%) complications, and of 9 serious events there were 2 deaths. These life-threatening complications were attributed to tube obstruction and malpositioning after dislodgement.⁵

Massive hemoptysis, a life-threatening condition, may be managed with bedside bronchoscopy and we presented 1 such case. The efficacy of bronchoscopy-guided topical hemostatic tamponade therapy has been recently described by Valipour et al.⁶ The technique was successfully performed on 56 out of 57 patients with an immediate arrest of hemoptysis. All the patients were successfully treated and remained free of hemoptysis for the first 48 hours and none required immediate surgery. The need for surgical residents to become adept at bronchoscopy is important.

The "rescue successes" detailed describe some of the acute problems that surgical residents treat. Other emergent surgical bedside procedures not described include cricothyroidotomy and tracheostomy for respiratory distress, bronchoscopy for removal of foreign object or mucous plug, and pericardiocentesis for cardiac tamponade.

In some cases presented, attempts at control of bleeding before the arrival of the surgical residents failed. It is likely these patients would have exsanguinated without the surgical rescue. The patients who required opening of the neck incisions could have completely lost their airways and they also would have likely suffered hypoxic complications and death without the surgical rescue.

Rapid response teams, respiratory therapists, critical care nurses, and medical residents play an important role in bedside emergencies. We have described situations, however, where surgical residents should have been called first. We have reviewed all of these cases at our Morbidity and Mortality conferences in

a collegial multidisciplinary fashion. These discussions have expedited changes in management that is a continuous process to improve patient safety. In no way is this paper meant to discredit or downplay the importance of the rapid response team. Bleeding is best handled by surgical residents, who are trained to deal with hemostasis problems inherent to most surgical procedures. Secondly, invasive procedures, such as emergent chest tube insertion, venous cutdowns, and bronchoscopy may be handled more expeditiously by surgical residents, especially when attending physicians are not immediately available in the hospital.

Clearly the complications presented are not rare and appear in most hospitals. We are also unaware as to the results of poor outcomes in hospitals without surgical residents or surgeons present in the hospital to manage these problems. The results of outcomes of the management of these problems have not been documented comparing teaching and nonteaching hospitals. Many of us take for granted the routine "rescue successes" by surgical residents. Although these events may be considered "quiet victories," we make it a practice at our Morbidity and Mortality conference to praise our residents who have rescued patients, and deserve special mention. We also keep track of any attending operative rescue of another surgeon and present those cases, as well. This public praise perhaps has encouraged the collegial policy of surgeons immediately responding to help each other and has saved many lives over the years. This was

reported in our report, "An eight year analysis of surgical morbidity and mortality; surgical data and solutions."³

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