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Editorial

The "which came first, the Chicken or the Egg" of deep Sternal Wound Infections

Edmond B. Cabbabe*

Department of Surgery, St Louis University School of Medicine, USA

***Corresponding author**

Edmond B. Cabbabe, Adjunct Professor of Surgery, St Louis University School of Medicine, Past President and current Board Member, American Medical Association Foundation Chairman, Missouri Delegation at the AMA House of Delegates Board Member, Missouri State Medical Foundation, Past President and current Board Member, Missouri State Medical Association Insurance AgencyChair, Board of Directors, The Center for Patient Safety, Tel: 314-842-5885, Fax: 314-842-7792, USA, Email: ebcsl@aol.com

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EDITORIAL

The field of interventional cardiology made significant headways recently. The advancement arose from better radiographic equipment, catheters, stents, and anticoagulants. This was further enhanced by a great deal of experience gained by interventional cardiologists allowing them to perform more complex and re-do cases. Newer procedures expanded their role in many indicated procedures previously belonging to the surgeons. The net result of this advancement has left the sickest patients and the most complicated cases to the cardio- thoracic surgeons. The percentage of patients with surgical complications changed accordingly due to their increased co-morbidities and complexities. Furthermore, the infective pathogens have gotten more diverse and resistant.

As a plastic surgeon who has a keen interest in the management of cardio-thoracic surgical wound complications, I observed and dealt correspondingly with these changes for almost four decades.

The 21st century brought us, as a result of the above noted variations, a decrease in the number of cardio-thoracic surgical procedures corresponding with the increase of interventional cardiology procedures.

With regulators and insurers taking a closer look at cost and benefit, hospital systems competing for patients, and patients looking for the hospital and surgeon with the best outcomes, we observed a sincere interest by all parties to minimize surgical risks and complications. The shift to off pump, robotic, and mini-sternotomy, mini invasive cardiac surgery and others have not reduce these "uneventful events" as the complications of sternal wound dehiscence, sternal osteomyelitis, mediastinitis, and hemisternum separation continue to be cause extended hospitalizations, disabilities, death and with all of these comes the financially prohibitive cost in an era of Diagnosis-Related Group (DRG) which is a statistical system of classifying any inpatient stay into groups for the purposes of payment.

In a previous publication, we studied the surgical management of this infection using radical sternal debridement and muscle flaps reconstruction comparing 2 groups of patients. One group was immediately referred to us when a clinical diagnosis of infection was made versus a second group referred after one to several debridements were first attempted. We showed a very significantly improved outcomes in the first group compared to the second in as far as morbidities, mortalities, length of hospitalization, and ultimately in cost reduction [1].

From my perspective as a plastic surgeon who manages on an ongoing basis these serious complications, the puzzling question that comes to mind when I see these critically ill patients was and still is: which of these problems occurred first? the sternal instability or the infection?

In some instances the answer can be found at exploration when the left hemisternum is found necrotic. The circular wires have cut it partially or completely causing transverse fractures and fragmentation. In other instances the instability is noted to be the result of a narrow sternum or an off midline sternal cut with insufficient bridge of bone to support and maintain the circumferential wires. Yet in many cases no clear mechanical cause is readily identified. A majority of these cases are reported to have pathologic findings of Osteomyelitis and abscess formation even when the cultures remain negative. Several will have no wound complication or sepsis but will develop sternal instability that may cause them to have chest pains, and popping and grinding. They will appear in the cardiologist's office or the hospital emergency departments and often get admitted for monitoring to rule out a new myocardial infarction. Their broken sternal wires can cause local pain and are a serious risk if the patient required cardiac massage [2].

When several patients develop an infection post operatively with the same pathogen, one can conclude that a breach in sterilization has repeatedly occurred or a member of the team is a carrier of the germ causing the infection. In these situations, and due to the busy daily surgical schedule and the late appearance of the first sign of an infection, a handful of uneventful events occur. Patients with a pre-existing acute or chronic infection somewhere in their bodies at the time of surgery or the post operative period are also seen. They present an explanation of why an infection with the same pathogen has developed in their surgical wounds.

Absent of these situations, the rest of the cases are left with no clearly identifiable cause for the infection.

Some patient are more prone to develop wound complications no matter what surgical procedure is performed. Diabetes Mellitus, renal failure, malnutrition, smoking, Chronic Obstructive Pulmonary Disease (COPD), chronic and acute coughing, steroid use, radiation of the chest or breast, morbid obesity, etc…are some of these predisposing factors. Many of these diseases' bearers are today's cardiac surgery patients.

With the routine use of prophylactic antibiotics, often wound and blood cultures fail to reveal a pathogen early in the process. Sternal stability is difficult to assess in the early post operative period. Ct scan cannot differentiate between purulent fluid collection versus usual post operative changes, however, it will precisely identify separation of the hemi-sternum. Status of the circumferential wires or plates and screws.

In many instances, patients develop deep sternal wound infection with and without an obvious bone separation or wound dehiscence. The etiology (ies) causing the complication is often not easily identified. Is the cause of separation mechanical (loosened wires, soft bone, bone necrosis, violent coughing, barrel chest…), or a wound infection developed with eventual development of sternal separation or wound dehiscence? A study to determine the real and definitive cause of these complications is needed.

Clearly, if the answer to the puzzle is purely mechanical or bacterial in nature one can propose a prophylactic remedy to help minimize the risk of these complications. Until then we continue to manage these complications impromptu and the answer to who came first the egg or the chicken remains unanswered.

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