Perioperative Management and Strategies to Decrease Sternal Wound Infection

Sternal wound infection (SWI) is one of the most serious complication of cardiac surgery. SWI may lead to an extended hospital stay additional surgical procedures, antibiotic therapy; consequently the impact on health care costs are significant. This study has shown a significant reduction of pre-SWI from 3.4% to 1.1% and deep SWI from 3.2% to 1.6% following the implementation of evidence-based practice changes (Figure1).

The importance of proper hand disinfection cannot be overemphasized; one of the interventions instituted was the use of alcohol based Sterillium™ and chlorhexidine based Hibiscrub™. Waterless scrub times of 2 minutes were recorded and scrubbing technique was standardized according the Guideline for Hand Hygiene in Health-Care. The Safe Surgery Saves Lives checklist was introduced to achieve efficient operation time. The sternal closure is performed using surgical steel wires in single loop technique instead the figure-of-eight technique used previously. Since studies appear to show little if any benefit of the redon catheter in reducing wound infection its use was discontinued. An OPSITE Post-Op Visible wound dressing replaced the normal gauze dressing and this is left in place for 5 days. At the time of discharge the patient is instructed to apply a waterproof dressing when showering and to keep the wound dry and clean until all wound crust falls out. Consistent use of the Posthorax® vest has been shown to prevent deep sternal wound infections by providing stabilization of the thorax. The Posthorax® vest was introduced to the clinic to be worn by all sternotomy patients (Figure2).

1250 patients underwent cardiac surgery during the control period 2008-2010 and 439 patients during the post-intervention period 2012. There were no differences in age, gender, diabetes, BMI, creatinine, euro score or type of surgery between the two periods. There was significant difference in history of hypertension (79.5% and 68.0% respectively; $p<0.0001$), mean ejection fraction (53.4% and 54.6% respectively; $p=0.018$) and c-reactive protein (12.32 mg/ml and 11.95 mg/ml respectively; $p<0.001$) between the two groups but there was no correlation between these variables and SWI. No difference was observed in the types of surgeries performed during the two periods. Use of bilateral internal mammary artery (BIMA) was significantly more frequent in the post-intervention period than in the control period (31% versus 62% respectively; p 0.006). Surgical time (average 287 minutes versus 251 minutes respectively; $p<0.0001$), postoperative peak creatinine kinase (average 57.6 µg/L versus 53.7 µg/L; $p<0.0001$) intubation time (median 9 hours versus 5 hours; $p<0.0001$), and the volume of blood transfused (average 3.49 units packed red blood cells versus 3.02 units packed red blood cells; $p=0.030$) was significantly lower in the post-intervention period. The use of noradrenalin (average 9.35 µg/min versus 11.1 µg/min, $p=0.009$), was higher in the second period. SWI was associated with surgical time, intubation time, blood transfusion, use of noradrenalin and BIMA ($p=0.017$, 0.001, 0.04, 0.016, 0.021 respectively). Despite the higher BIMA and noradrenalin use multidisciplinary strategies resulted in fewer SWIs.

Figure 1 Rate of sternal infection during the control and post-intervention periods

Figure 2 The Posthorax® vest