Post cardiac surgery sternal wound sepsis burden, risk factors and outcomes at Red Cross War Memorial Children's Hospital, Cape Town, South Africa: A five-year experience

Fefekazi Mpisane*, Andre Brooks#, Susan Perkins*, Wisdom Basera† and Liesl Zühlke*,‡,∫

* Department of Paediatrics and Child Health, Red Cross War Memorial Children's Hospital, Faculty of Health Sciences, University of Cape Town, Observatory, Cape Town, South Africa # Chris Barnard Division of Cardiothoracic Surgery, Faculty of Health Sciences, University of Cape Town, Observatory, Cape Town, South Africa † School of Public Health and Family Medicine, Faculty of Health Sciences, University of Cape Town, Observatory, Cape Town, South Africa ‡ Division of Cardiology, Department of Medicine, Groote Schuur Hospital, Faculty of Health Sciences, University of Cape Town, Observatory, Cape Town, South Africa ∫ Division of Paediatric Cardiology, Department of Paediatrics and Child Health, Red Cross War Memorial Children's Hospital, Faculty of Health Sciences, University of Cape Town, Observatory, Cape Town, South Africa

Introduction & Objectives

Sternal wound infection (SWI) is an important complication of sternotomy post-cardiac surgery in adults and children and is associated with significant mortality and morbidity. It is classified into superficial and deep sternal wound infections according to the US Centers for Disease Control and Prevention (CDC). Superficial sternal wound infection (SSWI) is defined as an infection that occurs within 30 days of surgery and involves only the skin or subcutaneous tissue at the incision site. Deep sternal wound infection (DSWI) is defined as an infection that occurs within 30 days after surgery, if there is no implant in situ. Various risk factors for the development of sternal wound infection post-cardiac surgery have been reported. We aimed to describe the burden, risk factors and outcomes of SWI in post-operative paediatric cardiac patients at a tertiary children's hospital.

FIGURE 1: Deep sternal wound infection patient post-debridement.

Methods

We conducted a retrospective record review of cardiac surgeries via median sternotomy over a 5-year period from 1 January 2012 - 31 December 2016 at Red Cross War Memorial Children's Hospital (RCWMCH) to identify all cases of SWI. Data were collected from the following sources: i) cardiac surgical database; ii) cardiothoracic surgical case notes; iii) infection control database; and iv) National Health Laboratory Services (NHLS). All paediatric patients, regardless of age, who underwent cardiac surgery at RCWMCH via the sternotomy approach during the study period were included and all patients who underwent thoracic surgery for non-cardiac conditions and cardiac surgeries other than the sternotomy approach were excluded. Medical records were reviewed for each patient and demographic (sex, age, genetic associations and type of congenital heart disease), surgical (length of bypass and cross-clamp times, number of postoperative ICU days, inotropic support, antibiotic prophylaxis and ventilation duration) and outcome (morbidity and mortality) data were extracted. Stata 16 was used for data analysis.

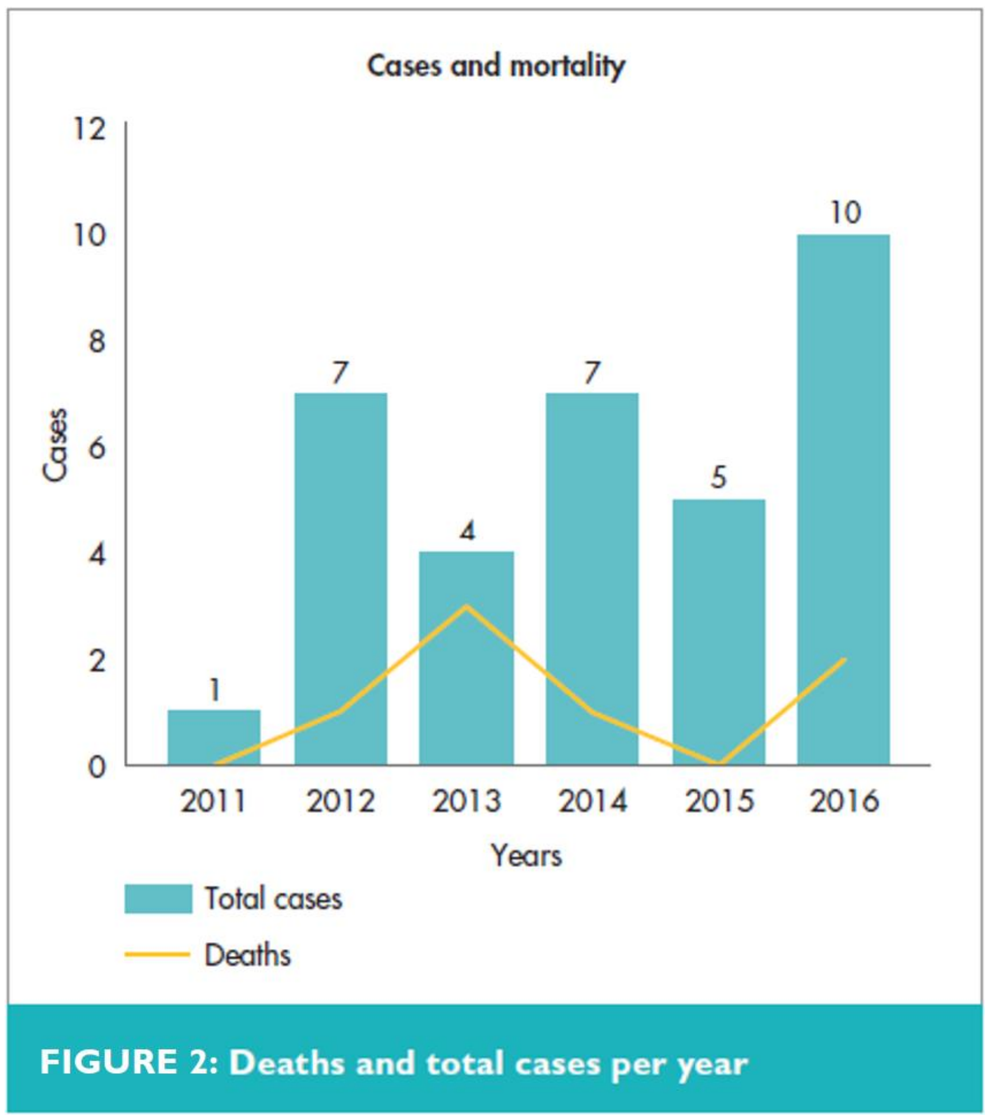

FIGURE 2: Deaths and total cases per year

Results

Between 2011 and 2016, 1 319 patients underwent median sternotomy. Thirty four (2.6%) patients developed SWI; 18 (13%) patients developed DSWI, and 16 (12%) developed SSWI. Twenty three of those with SWI (67.7%) had cyanotic congenital heart disease and the majority of these patients developed DSWI (72.2%). Twenty two (16%) of SWIs were apparent within a week post surgery before discharge, and the remaining were readmitted post-discharge.

TABLE 1: Morbidity and mortality outcomes.

Characteristic	Total n=34	Deep wound n=18	Superficial n=16	p-value
ICU duration (days), median (IQR)	7.1 (3.6 - 16.1)	8.6 (5.2 - 16.1)	3.9 (2.9 - 17.2)	0.29
Antibiotic days, median (IQR)	12.5 (7 - 40)	9 (6 - 35)	17.5 (9 - 42)	0.08
Number of treatments, median (IQR)	2.0 (1.0 - 4.0)	2.5 (1.0 - 3.0)	2 (1.0 - 4.0)	0.89
Length of hospital stay (days), median IIQR)	28.5 (2 - 42)	29 (22 - 49)	27.5 (16.5 - 41)	0.78
Death, n (%)	7 (20.6)	4 (22.2)	3 (18.8)	0.80

Seven (0.5%) patients died from complications. Of the seven (20%) patients who died from surgical site infections (SSI) complications, 4 had DSWI and 3 had SSWI. Of the 4 patients with DSWI, 3 had emergency surgery for complex cyanotic CHD and 1 had elective surgery.

Conclusion & Potential Implications

Significant morbidity was associated with SWI post cardiac surgery and a mortality rate of 20% was identified in the case of DSWI. Despite these findings, there are no national guidelines in South Africa to help surgical programmes reduce infection rates. We, therefore, strongly support quality improvement procedures such as the Sternal Wound Prevention Bundle (SWPB) that was introduced at RCWMCH in late 2014. However, the rate of SWI implies that ongoing monitoring and evaluation of the SWPB is necessary and more stringent adherence to the protocol may result in better outcomes.

Children's Heart Disease Research Unit
Conduct, promote and support children's heart disease research on the African continent

R.C.W.M.C.H. R.O.H.V.K.

University of Cape Town • iYunivesithi yaseKapa • Universiteit van Kaapstad