Innovative surgical sternal closure technique for deep sternal wound infection post open heart surgery

Erez Kachel¹, Leonid Sternik¹, Eyal Ran Nachum¹, Ido Ferstenfeld¹, Yaron Moshkovits², Ehud Raanani¹

1. Cardiac Surgery, Sheba Medical Center, Israel
2. Cardiac Surgery, Assuta Medical Center, Israel
Deep sternal wound infection is one of the most feared complications in patients undergoing cardiac surgery with decreasing long and short term survival, increasing hospitalization period and severely impaired quality of life.
Mediastinitis

- Reported incidence 2 - 5%.
- Reported mortality is up to 40%.
- Mean duration of hospitalization is up to months.
- Average cost is three times higher than of patients with uncomplicated post operative course.
Does post operative mediastinitis still a problem in 2015 ????

1. Decrease number of open heart surgeries
2. Increased ability of wound healing techniques
3. Better imaging techniques
4. Advanced techniques for sternal reconstruction surgeries

1. We operate sicker and older patients
2. Negative pressure devices, growth factors
3. The diagnosis is clinical
4. Pectoralis muscle flaps, omental flaps, rectus abdominis flaps

Which brings us BACK TO SQUARE 1
IMPACT OF STERNAL WOUND INFECTIONS

- Increased Morbidity/Mortality (16-30%)
- Decreased Long-Term Life Expectancy
- Prolonged Hospital Length of Stay
- Raises Hospital Costs By $62,000
- IS PUBLICALLY REPORTED

THE US CENTER FOR MEDICARE AND MEDICAID SERVICES (CMS) WILL NO LONGER REIMBURSE HOSPITAL COSTS INCURRED IN THE TREATMENT OF DEEP STERNAL WOUND INFECTIONS (DSWI) FOLLOWING CABG SURGERY
Despite advanced and expensive diagnostic methods, the diagnosis of mediastinitis is still clinical.
There is no general consensus regarding the appropriate approach for that complication and a wide range of strategies are being used.

Dressings: alginates, silver alginates, moister, wet to dry, dry to wet

Negative Pressure Devices – treatment or prevention

Surgical technics – Sternotomy +/- Bilateral Pectoralis Muscle Flaps +/- Omental Flaps
The sternoplasty procedure

30% redehiscence

45% In hospital mortality (thoracic instability requires long term ventilation and immobilization, and its complications – pneumomia, thrombosis, muscular weakening....)

The main reason for failure is the huge thoracic shear forces which now being loaded only on the muscle flaps
The Modified Sternoplasty surgery

preconditions:
1. Infection (sepsis) control – antibiotic treatment
2. Metabolic control
3. Controlled Negative pressure TX,
The Modified Sternoplasty surgery
(The four steps sternoplasty surgery)

1. Sternectomy
2. Bilateral Robiczek (longitudinal) wires
3. Horizontal sternal wires anchored laterally to the longitudinal wires
4. Bilateral pectoralis muscle flaps
TRICKS AND TIPS:

Dissect all adhesions pleural space to pleural space

High risk patients – go on bypass

Both the longitudinal and the horizontal wires should be at midclavicular line inserted into the ribs away from the infected zone

Leave at least 6 cheat drains. The JP flaps drains should be removed only when they are totally dry
Our clinical experience:

2011 – 2015
37 Patients - full blown mediastinitis and fully dehisced sternum
7 Medical Centers
4 Different countries
Mean age 73y
Mean post operative hospital stay 16 days
Up to 4 years follow up

Mortality – 2 uncontrolled sepsis

Intra operative complications:
- RV rupture during adhesions dissection required urgent femoral cannulations and going on bypass
- RIMA to RCA damage

Post operative Complications –
- 3 superficial post operative infection treated successfully conservatively
Although surgically demanding, the Modified Sternotomy Technique provides very good clinical outcome lowering morbidity and mortality and became the common surgical approach for that complicated group of patients at our institute.

CONCLUSION