

# **BACKGROUND:**

- Surgical site infections (SSI) following congenital heart surgery remain a significant source of morbidity and mortality with an estimated incidence as high as 11% [1]
- Delayed sternal closure (DSC) is often necessitated particularly in neonates to limit the deleterious effects of sternal closure on post-operative hemodynamics.
- While open chest resuscitation is an established risk factor for post-operative infection, the effect of open chest duration on infection remains less well-defined.

## **PURPOSE:**

- Evaluate incidence of SSI in a single institution patient cohort with delayed versus primary chest closure.
- Determine the effect of open chest duration on the incidence of surgical site infection.

### **METHODS:**

- Retrospective review of institutional Society of Thoracic Surgeons dataset, 2015 to 2020.
- Patients with SSI were identified within a prospectively collected institutional dataset and matched accordingly.
- Definition of infection was standardized prospectively among a multi-disciplinary team reviewing all potential SSI.
  - Initiation of antibiotics for presumptive clinically-diagnosed infection
  - Positive wound culture obtained by standardized technique
  - Requirement for incisional re-opening/debridement as judged by surgeon
- Audits for all DSC patients were performed by retrospective chart review to confirm both SSI diagnosis and open chest duration.

# **Open Chest Duration Following Congenital Cardiac** Surgery Increases Risk for Surgical Site Infection

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### **RESULTS:**

- 2582 operations were performed in 2492 patients:
- 195 DSC cases/177 patients
- 2387 primary chest closure (PCC) cases
- chest duration on the incidence of SSI.

# **DSC PATIENT CHARACTERISTICS:**

Patient characteristics (n=17)# Age 0.15±0.21 Temale Gender 10 (58.5%) Weight (kg) 3.6±1.7 Race/Ethnicity N (%) Caucasian 2 (11.8) Black 1 (5.9) Hispanic 9 (52.9) Other 5 (29.4) Categorical variables are expressed as N (%). Continuous variables are expressed as mean v P values less than 0.05 are bolded. bbreviations: kg, kilograms. DSC PATIENT OPERAT SSI Operative characteristics (n=17)# Norwood procedure 4 (23.5) TAPVC 3 (17.6) Aortic arch repair 2 (11.8) Categorical variables are expressed as N (%). Continuous variables are expressed as mean v P values less than 0.05 are bolded. bbreviations: Kg, kilograms.	(n=160)# 0.71±2.7 69 (43.1%) 5.3±8.6 N (%) 72 (45) 6 (3.8) 47 (29.4) 35 (21.9) with standard deviation. <b>TIVE DETAILS:</b> Non-SSI (n=160)# 45 (28.1) 12 (7.50) 2 (1.25) with standard deviation.	P value   0.386   0.216   0.426   0.0017   0.668   0.087   0.480
Age 0.15±0.21   Female Gender 10 (58.5%)   Weight (kg) 3.6±1.7   Race/Ethnicity N (%)   Caucasian 2 (11.8)   Black 1 (5.9)   Hispanic 9 (52.9)   Other 5 (29.4)   Categorical variables are expressed as N (%). Continuous variables are expressed as mean values less than 0.05 are bolded.   Dbreviations: kg, kilograms.   DSC PATIENT OPERAT   able 2. Operative details for 177 delayed sternal closure (DSC) patients with SSI vs non-SSI   SSI   Operative characteristics (n=17)#   Norwood procedure 4 (23.5)   TAPVC 3 (17.6)   Aortic arch repair 2 (11.8)   Categorical variables are expressed as N (%). Continuous variables are expressed as mean P values less than 0.05 are bolded.	0.71±2.7 69 (43.1%) 5.3±8.6 N (%) 72 (45) 6 (3.8) 47 (29.4) 35 (21.9) with standard deviation. <b>FIVE DETAILS:</b> Non-SSI (n=160)# 45 (28.1) 12 (7.50) 2 (1.25) with standard deviation.	0.386 0.216 0.426 0.0017 0.668 0.087 0.480 P value 0.687 0.153 0.005
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DSC PATIENT OUT	COMES	
able 3. Outcomes for 177 delayed sternal closure (DSC) patients with SSI vs non-SSI		
SSI	Non-SSI	
Outcomes (n=17) <sup>#</sup>	(n=160)#	P value
Open chest duration 14.2±16.2	4.31±4.86	0.024
Postoperative mortality 2 (11.8)	26 (16.3)	0.630
Categorical variables are expressed as N (%). Continuous variables are expressed as mean	with standard deviation.	
P values less than 0.05 are bolded.		
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DOL PAHEINIO NADA NIGHER INCIDENT	LE UF PUJI-UPERA	
	NATICNITC	
	PAHEINIS	
10.0%		
8.7%		
9.0%		

7.0%

5.0%

4.0%

3.0%

2.0%

0.0%

SSI

• 177 patients with DSC were evaluated to determine the association of open



PCC

- days)
- LIMITATIONS:
- All ages and operations were included.
- Antibiotic utilization was not audited.
- Continuous gram-positive coverage during open chest period is standardized at our institution.
- Day of SSI onset is subjective with limited
- standardization.

# **CONCLUSION:**

- Incidence of SSI is higher in patients undergoing delayed sternal closure compared to patients with primary chest closure.
- Duration of post-operative open chest resuscitation is associated with an increased risk of post-operative SSI. Prolonged open chest duration represents a potentially modifiable risk factor for SSI predisposition.
- Daily post-operative assessment of candidacy for chest closure is supported to minimize the risk of SSI.

# **REFERENCE:**

[1] Harder EE, Gaies MG, Yu S, et al. Risk factors for surgical site infection in pediatric cardiac surgery patients undergoing delayed sternal closure. J Thorac Cardiovasc Surg 2013;146:326-33.



# **SUMMARY:**

The incidence of SSI within the cohort was 1.8% (n=47) DSC patients had significantly higher incidences of SSI (8.7%) than PCC patients (1.3%, p=0.041, OR:6.7) Within the DSC cohort, patients that went on to develop SSI had a longer open chest duration (mean=14.2 days) when compared to non-SSI DSC patients (mean=4.31