Comparison of sternal pain and narcotic requirement after cardiac surgery between new rigid closure and conventional wire closure: follow-up results of 50 randomizations.

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Comparison of sternal pain and narcotic usage after cardiac surgery between new rigid closure and conventional wire closure

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Objective
To investigate if rigid closure reduces sternal pain

Methods
Prospective randomized CABG +/- valve
Study period: 07/2011 – 1/2013
Rigid fixation: n=24
Wire closure: n=26

Total Narcotic Requirement

Pain Score

Randomization

Total number of CABG +/- valve
N=214

Preop exclusions (147)

Age >65 (26)
Emergency (12)
Redo sternum (20)
Hemodialysis (15)
Hx of Osteoporosis (11)
Radiation hx (2)
Malignancy (11)
Immunosuppression (4)
Known coagulopathy (4)
Infections, IE (7)
Metal allergy (2)
BMI above 40 (6)
Compliance (8)
Refusal (19)

Intraop exclusions (17)
Unscheduled aortic surgery (3)
Osteoporosis (6)
Bleeding (8)

Total number of Randomization
N=50

Rigid Fixation (24)
Wire Closure (26)

Patient Risk Factors

Rigid Wire P
Age 65 ± 9 65 ± 9 0.91
Male 20 (83%) 21 (81%) 0.81
BMI 31 ± 5 29 ± 5 0.39
Poor EF(<40%) 4 (16.7%) 3 (11.5%) 0.60
Diabetes 12 (50%) 11 (42.3%) 0.59
Insulin user 6 (25%) 9 (34.6%) 0.46
Smoking 6 (25%) 11 (42.3%) 0.19
PVD 6 (25%) 2 (7.7%) 0.93
Cr above 1.5 4 (16.7%) 0 0.29
CABG 15 (62.5%) 20 (76.9%) 0.27
Valve 7 (29.2%) 4 (15.4%) 0.24
CABG + Valve 2 (8.3%) 2 (7.7%) 0.93

Postop Outcomes

Rigid Wire P
Intubation hours 7.6 ± 5.0 10.5±10.5 0.21
Intubation >24 h 0 2 (7.7%) 0.17
ICU stay hours 51.5 ± 26 49 ± 41.7 0.79
ICU stay > 48h 10 (42%) 10 (39%) 0.82
Postop stay days 6.6 ± 2.9 7.1 ± 4.6 0.65
Postop stay >7d 7 (29.2%) 8 (30.8%) 0.90
Postop CVA 1 (4.2%) 0 0.29
Atrial Fibrillation 6 (25%) 8 (31%) 0.65
Superf sternal infection 1 (4.2%) 0 0.29
Deep sternal infection 1 (4.2%) 0 0.29
Pneumonia 0 1 (3.8%) 0.33

Conclusion
Randomized data showed a trend of fewer narcotic requirement in rigid fixation than in conventional wire closure.

Implications
Rigid fixation may potentially improve immediate sternal pain after open heart surgery.
Less narcotic requirement potentially facilitate early return to the normal activity. Larger population is required to justify study.

Postop Outcomes Dosage Calculation

Total Narcotic Requirement

There was a trend of less narcotic requirement in group R

Narcotic Requirement Dosage Calculation

IV PO
Morphine 1mg 3mg
Hydromorphone 0.15mg 0.75mg
Percocet N/A 3mg
Fentanyl 0.01mg (10mcg) N/A

e.g.
5 mg PO morphine is equianalgesic to 1.33mg IV morphine.
2 mg PO hydromorphone is equianalgesic to 2.67mg IV morphine.

24 hours narcotic requirement was calculated using the following formula and expressed in IV morphine equivalent

<table>
<thead>
<tr>
<th>Day</th>
<th>Rigid</th>
<th>Wire</th>
<th>P</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>2.4</td>
<td>1.9</td>
<td>0.99</td>
</tr>
<tr>
<td>2</td>
<td>2.0</td>
<td>2.0</td>
<td>0.99</td>
</tr>
<tr>
<td>3</td>
<td>0.7</td>
<td>0.7</td>
<td>0.99</td>
</tr>
<tr>
<td>4</td>
<td>0.3</td>
<td>0.3</td>
<td>0.99</td>
</tr>
<tr>
<td>5</td>
<td>0.3</td>
<td>0.3</td>
<td>0.99</td>
</tr>
</tbody>
</table>

P=0.61 Trend of less pain in R group

Immunosuppression (4)
Known coagulopathy (4)
Infections, IE (7)
Metal allergy (2)
BMI above 40 (6)
Compliance (8)
Refusal (19)

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