

## **A Retrospective 2-Year Review Of The Outcomes Of Surgical Rib Fixation Following Chest Wall Injury By The Multi-Disciplinary Chest Wall Injury Group In A Major Trauma Centre And The Change In Outcomes As The Service Has Developed.**

Trauma / Polytrauma / Surgical Treatment

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### **Background**

Rib fixation remains a contentious topic with relatively little evidence of its efficacy. The management strategy for rib fractures globally is largely conservative. All English major trauma centres offer rib fixation, and the most recent guidance from the National Institute for Health and Care Excellence in October 2010 indicates that surgical chest wall stabilisation is beneficial in patients with multiple rib fractures or a flail segment. The benefit is in terms of improved lung function, and reduction in both critical care length of stay (LOS) and total hospital LOS. Surgical stabilisation of rib fractures in appropriate patients has revealed encouraging initial results but worldwide the data does not define who the appropriate patients are. Further data is needed to configure national standards and a guideline for rib fracture management.

### **Objectives**

Our first aim was to establish if there was any improvement in patient outcomes following rib fixation at Salford Royal Foundation Trust (SRFT). We compared the first 32 patients who had rib fixation with a matched group of SRFT patients before rib fixation was introduced. Our second aim was to determine if the rib fixation service has improved by comparing the outcomes of the first 32 patients with the subsequent 18 patients.

The outcomes identified were mortality, critical care LOS, and total hospital LOS. As there is little literature surrounding rib fixation, we were trying to determine whether operative management improves outcomes compared to non-operative management and the indications for fixation.

### **Study Design & Methods**

We performed a matched cohort study whereby 32 patients who underwent rib fixation were independently matched with conservatively managed patients.

We performed a retrospective re-audit to compare outcomes since our matched cohort study. We collected patient data at SRFT and used two primary statistical tests. When comparing continuous variables we used the Mann-Whitney test and for categorical variables we used the chi<sup>2</sup> test. We set the significance level to a p-value less than 0.05 for both tests.

### **Results**

In our initial study, the most significant finding was the reduction in mortality of 33.4% in patients over-55 years of age when comparing rib fixation patients to those managed conservatively. There was 1 death in the first study that was unrelated to rib fixation and no deaths in the second group which reduced mortality further. The mean LOS in the under-55 age group was reduced by 4.5 days. In

addition, this study revealed an average of 4.1 days from patient admission to operation, 12.7 days critical care LOS, and 29.1 days total hospital LOS.

Results of the second study group revealed an improvement in all outcomes. Time from admission to operation reduced by 2.0 days to an average of 2.1 days. Critical care LOS reduced by 5.2 days to 7.5 days and total hospital LOS reduced by 8.4 days to 20.7 days.

### **Conclusions**

Our initial study revealed a lower LOS in the under-55 group and a significant reduction in mortality in the over-55 group. This reinforces early evidence that rib fixation improves patient outcomes. The re-audit identifies that SRFT are identifying patients for fixation sooner with an average time to fixation reduced from 4.1 days to 2.1 days. This is an important finding as the evidence to date has not identified optimal time for rib fixation in the trauma patient. Particularly as the length of stay has further decreased in our second study, it indicates that earlier fixation results in the avoidance of sequelae related to rib fractures and therefore patients have a better outcome more quickly.