

Better Visualization of Pressure Data During Scoliosis Surgery in Relation to LFCN Injury

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Introduction

- Scoliosis is a three dimensional deformation of the spine, most often recognised by an S Shaped curve. If it progresses it may become a cosmetic and health issue requiring surgery.
- In some cases the process of performing scoliosis surgery can cause redness on the hips and damage to the lateral femoral cutaneous nerve (LFCN).

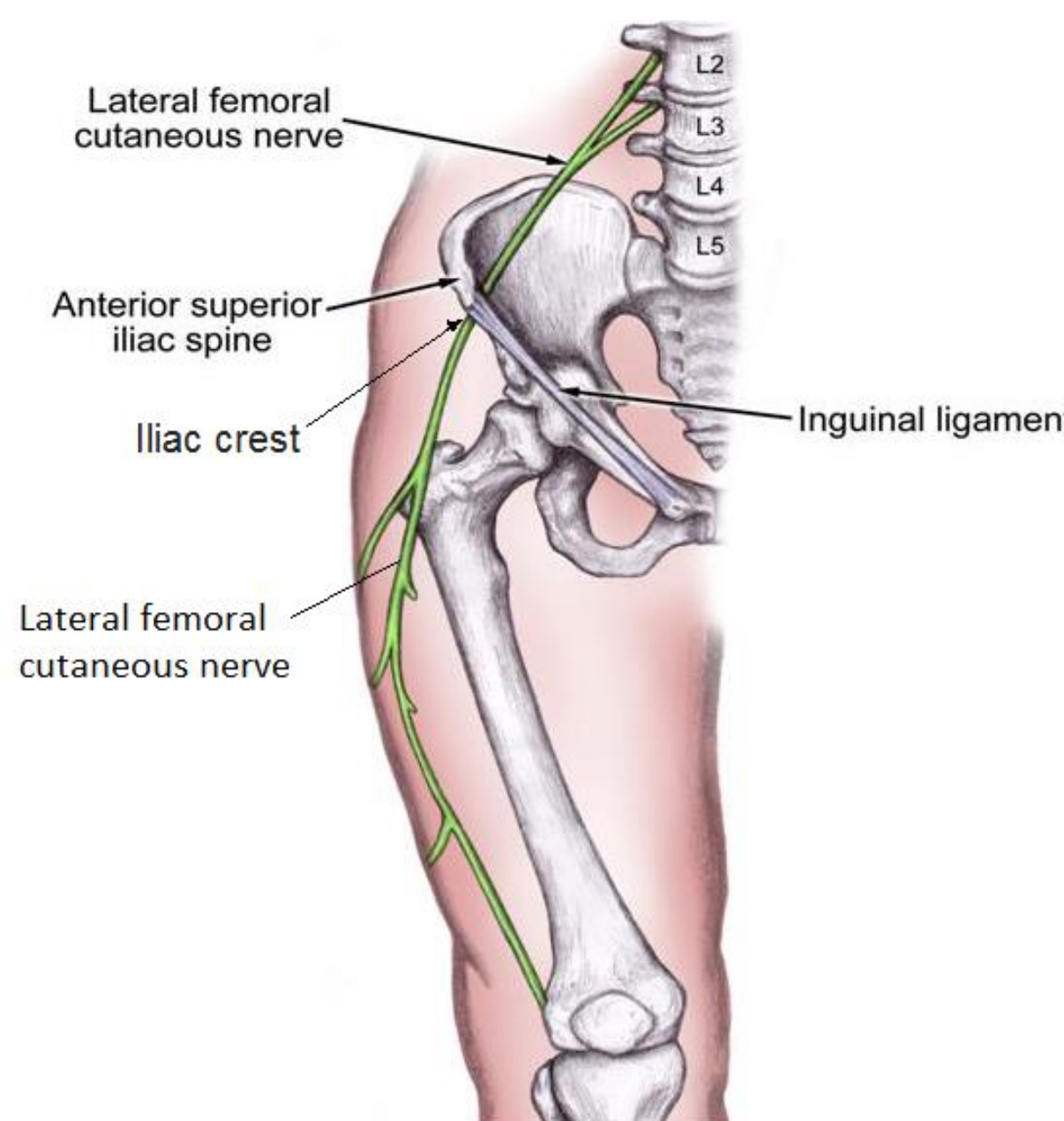


Figure 1: Image of the LFCN placement in the human body¹

- It was hypothesized that this was possibly due to high pressures on the front part of the thigh during the surgery. These pressures were measured throughout the timeframe of each surgery using a FSA (Force Sensing Array) system.

Methods

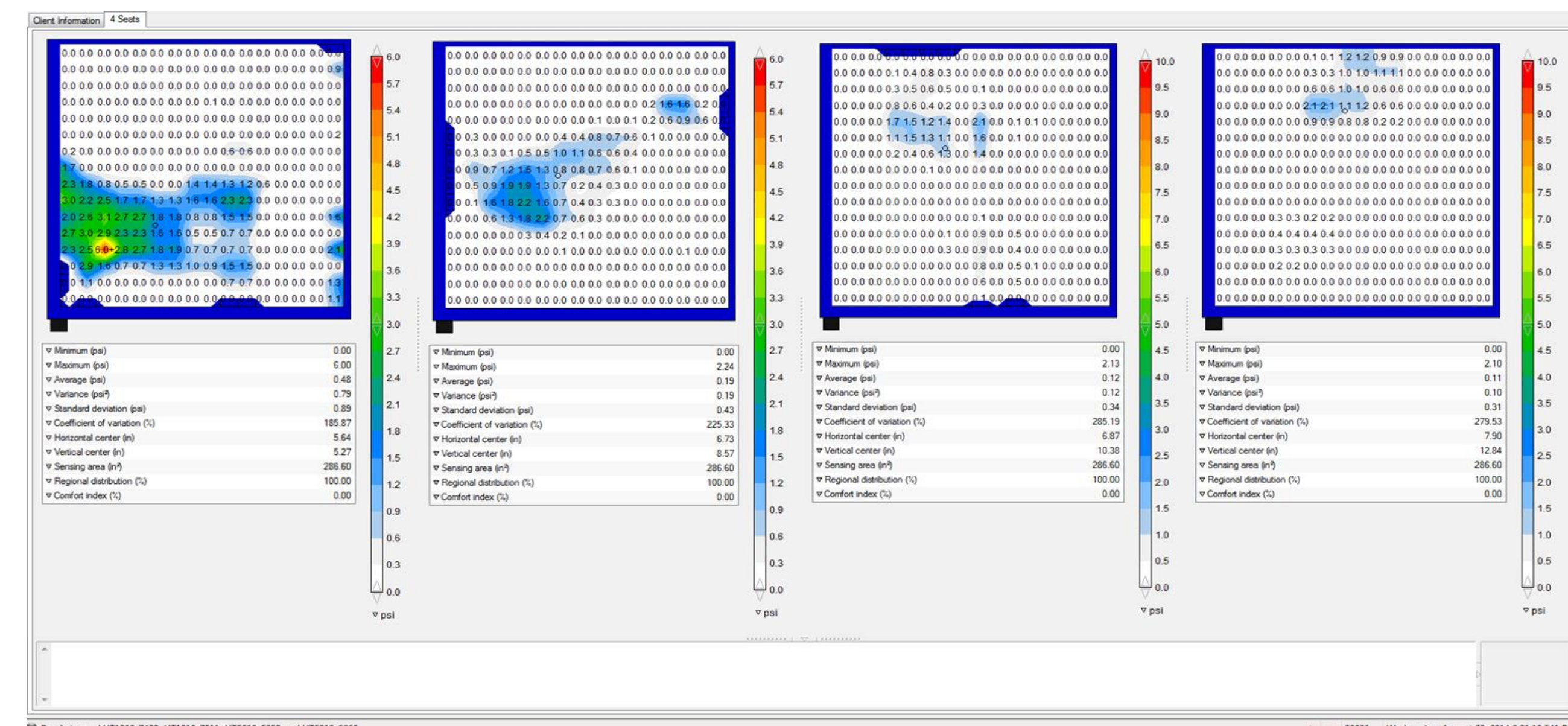


Figure 2: An image of an FSA file during screw insertion at the time 2:31:10 PM

- 23 patients between the ages of 9-18 were recruited from the University of Alberta Stollery Children's Hospital.²
- The FSA system mats were placed under each shoulder and hip for a total of four mats per patient to collect data throughout the surgery.
- Data collection was sometimes interrupted so that there were up to 13 FSA files for each surgery.

- After the operation each patient was followed up to collect information including:
 - Age and gender
 - Weight and height
 - Exams near the iliac using light touch to determine if numbness or tingling was present.
- Data was then strung together from the FSA Data using a MATLAB (matrix laboratory) program.

Results

- The organization process involved converting the FSA data to Excel. Once converted to Excel the data could then be strung together using a MATLAB.
- Data files were very large, often with over 40,000 points.
- Once strung together each case could be looked at as a whole to find the average and maximum pressure throughout the surgery, and then compare it with other surgeries.
- The follow up resulted in 48% of patients having redness on the hips and an average pressure 29.4 mmHg.
- Out of all the patients, 17% had numbness or tingling of the LFCN and an average pressure of 30.6 mmHg

Figure 3.1: A graph displaying the average pressure throughout surgery.

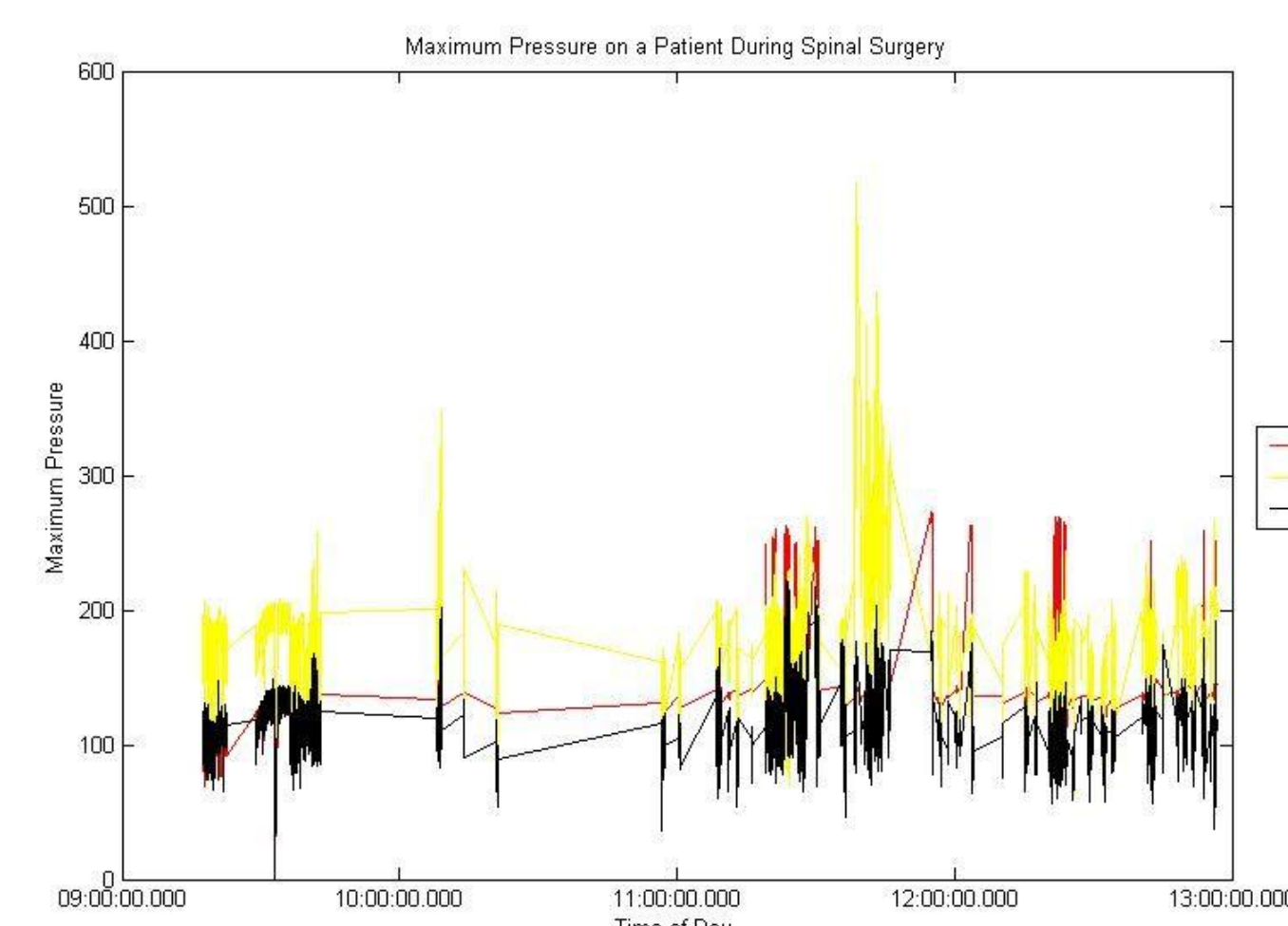
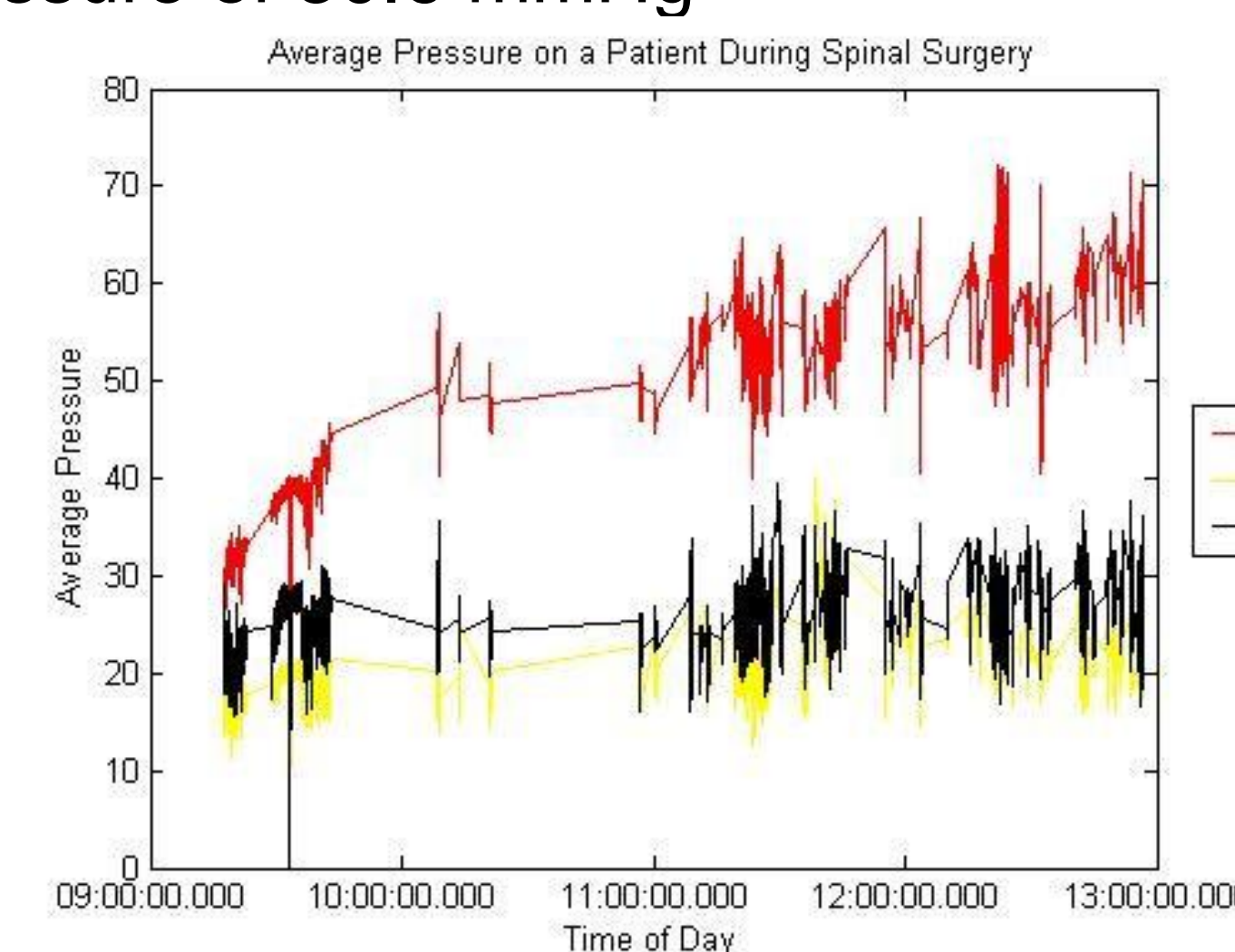


Figure 3.2: A graph of the maximum pressure during surgery

Conclusion

- In conclusion, data was organised and a method was created to string multiple files together.
- Although high pressures were often affiliated with redness and LFCN injury they are not significant in causing these issues.
- Instead what seemed to have the biggest effect was the duration of the surgery.



Figure 4: Redness of the hip associated with pressures over time during Scoliosis surgery.

Future Projects

- More work will need to be completed to find out if the amount of time in which pressure is above a certain threshold has effect on redness and LFCN injury.
- By finding this pressure time relationship for future scoliosis patients, dangerous levels could be determined in order to reduce LFCN injury during surgery.

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Literature Cited

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