INTRODUCTION

- Automotive crashes result in injury to different body regions, but in particular, the abdomen is a site of potential life-threatening injuries due to housing vital body organs [1].
- The spleen is the second most injured organ following the liver; splenic injuries are estimated to be 23.1% while those to the liver are 39.2% of all abdominal organ injuries [2].
- Blunt impacts to the abdominal region in automotive crashes are the main cause of liver and spleen injuries.
- However, less research has focused on injury mechanisms to the spleen than to the liver.
- There is a need to define the injury mechanism of splenic injuries in automotive crashes.
- This study investigated the correlation between injury to the spleen and pressure changes in spleen due to blunt impacts.
- A series of experiments was conducted to evaluate whether pressure changes in spleen due to blunt impacts.

METHODS [3]

1. Obtain ex vivo spleens from autopsies and inspect for any visible damage prior to testing.
2. Test fixture
   - Free-fall drop tower—which includes a load plate (23.4 kg) attached to the guide rails with two load cells to measure force applied to the spleen [Figure 3].
3. Prepare and instrument the spleen
   - Identify the splenic artery (a) and vein (v).
   - Insert foley catheters into the artery and vein [Figure 1b].
   - Insert pressure sensors [Figure 1c] to splenic a. & v. through foley catheters.
   - Connect foley catheters to saline reservoirs for spleen perfusion [Figure 2].
4. Apply blunt impacts to the ex vivo spleen by varying the drop height of the load plate [Table 1].
5. Data analysis
   - Injury analysis [Table 2]
   - Pressure analysis
     - Pressure vs. Time
     - Force vs. Time

RESULTS & DISCUSSION

- Only the splenic a. was instrumented with a foley catheter and a pressure sensor due to the size of the splenic vein.
- 3 ex vivo spleens were tested and vascular pressures were measured from impact-induced hydrostatic pressure changes inside the spleen.
- The hydrostatic pressure changes in spleen showed correlation with injury.
- Severely injured spleens had higher peak pressure [Table 3].
- These initial experimental blunt spleen injuries produced in this testing compared well with those observed in motor vehicle crash victims.
- Further testing of ex vivo spleens is needed to verify these initial findings.

CONCLUSIONS

REFERENCES CITED

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