41947 - Failure Pressure and Mechanism of Bile Bags and Jackson-Pratt Bulb Under Compression

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Disclosures

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Introduction

Closed drainage systems including bile bags and Jackson-Pratt (JP) bulbs are commonly used after neurosurgical procedures. The failure pressure and mechanism of these drains is not reported in the previous literature or by the manufacturers but may have clinically important ramifications.
Methods

We compressed bile bags in various configurations between two rigid supports with varying fluid volumes to identify the pressure and mechanism of failure. The bile bag failures were compared to compression of 100 mL JP bulbs filled with fluid and compressed from the sides.
Results

The average failure pressure of a bile bag with 300 mL of fluid and compressed flat was 24.0 kPa (95% CI 20.0 - 28.0 kPa) compared to a failure pressure of 13.6 kPa (95% CI 5.8 - 21.4 kPa) when folded. JP bulbs had a lower failure pressure of 4.3 kPa (95% CI 1.5 - 7.1 kPa). Failure of bile bags most commonly occurred at the endcap versus a seam. JP bulbs most commonly failed at the union of the port apparatus and body.
Results

![Average Failure Pressure Graph]

- Bile bag 300 mL and flat: Higher average failure pressure compared to the other setups.
- Bile bag 400 mL and flat: Slightly lower than the 300 mL setup but still higher than the folded and JP 100 mL setups.
- Bile bag 300 mL and folded: Lower average failure pressure than the flat setups but higher than the JP 100 mL setup.
- JP 100 mL: Lowest average failure pressure among the setups.
Discussion

When compressed a JP bulb fails at a lower pressure than a bile bag. Bile bag failure pressure is dependent on the configuration of the bile bag (folded versus flat) when force is applied. When bile bags or JP bulbs fail they fail at sites other than the flutter valve, decreasing the risk of fluid reflux from the drain to the surgical site.
Summary Points

• Jackson-Pratt bulbs fail at a lower pressure than bile bags

• Neither Jackson-Pratt bulbs nor bile bags fail in a way that allows reflux of fluid back to the operative bed