Results: Fifteen (28%) of the 54 pediatric liver transplant recipients had a SPSS, and 11 were ligated intraoperatively due to low portal vein flow (PVF). A median increase in PVF of 142 mL/min (interquartile range 0 to 600 mL/min) was observed after ligation. The left renal vein was ligated in 6 cases (55%) (Fig. 1). Graft survival was 96% during a median follow-up of 1.5 years (interquartile range 0.1 to 3.3 years), with no deaths or retransplantations occurring in the SPSS ligation group. A significantly greater incidence of portal vein thrombosis or stenosis was observed in the ligation group (45% vs 2%; \( p < 0.001 \)). Post-transplantation reoperation was also more common in the ligation group (36% vs 12%; \( p = 0.049 \)).

Conclusion: SPSS ligation at time of liver transplantation can help achieve excellent graft survival by augmenting portal vein flow to the graft in children but can be a risk factor for portal vein thrombosis and reoperative complications.

METHODS: Female juvenile mini-Yucatan pigs underwent laparotomy where gelatin-encapsulated compressed nitinol springs of 10-, 11-, or 12-mm diameter springs were inserted and plicated into the ileal lumen. Control segments distal to the spring were marked with sutures. Pigs were placed on a liquid diet postoperatively and euthanized on postoperative day (POD) 7. The length of spring and control segments were measured. Histologic sections were stained with hematoxylin and eosin.

Results: All pigs (n = 13) survived to POD 7 with no adverse effects and an mean \( \pm \) SD weight gain of 50.5 \( \pm \) 89.1 g/d. Compared with their respective control segments, 10-mm, 11-mm, and 12-mm diameter springs exhibited significant lengthening (\( p < 0.001 \); \( p < 0.05 \); Fig. 1A). All spring segments had thickened muscularis propria (\( p = 0.008 \); Fig. 1B). Increased crypt height was noted in some ileal segments containing the springs compared with control segments (\( p = 0.036 \); \( p = 0.007 \); Fig. 1C). When compared across the different diameter groups, spring segments were not significantly different in terms of lengthening, crypt height, or muscularis propria (Fig. 1D, 1E).

Conclusion: Spring-mediated distraction enterogenesis is successful in porcine ileum with springs of varying diameters resulting in comparable structural changes within the intestine. A smaller-diameter spring is as effective as a larger-diameter spring in lengthening ileum.

The Effect of Spring Diameter on Porcine Distraction Enterogenesis
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Introduction: Morbidity and mortality for short gut syndrome continues to be high in part due to complications from treatment. Spring-mediated distraction enterogenesis has proven to be a successful method of lengthening porcine intestine. We aim to evaluate the effect of varying spring diameters on intestinal growth.

Methods: Female juvenile mini-Yucatan pigs underwent laparotomy where gelatin-encapsulated compressed nitinol springs of 10-, 11-, or 12-mm diameter springs were inserted and plicated into the ileal lumen. Control segments distal to the spring were marked with sutures. Pigs were placed on a liquid diet postoperatively and euthanized on postoperative day (POD) 7. The length of spring and control segments were measured. Histologic sections were stained with hematoxylin and eosin.

Results: All pigs (n = 13) survived to POD 7 with no adverse effects and an mean \( \pm \) SD weight gain of 50.5 \( \pm \) 89.1 g/d. Compared with their respective control segments, 10-mm, 11-mm, and 12-mm diameter springs exhibited significant lengthening (\( p < 0.001 \); \( p < 0.05 \); Fig. 1A). All spring segments had thickened muscularis propria (\( p = 0.008 \); Fig. 1B). Increased crypt height was noted in some ileal segments containing the springs compared with control segments (\( p = 0.036 \); \( p = 0.007 \); Fig. 1C). When compared across the different diameter groups, spring segments were not significantly different in terms of lengthening, crypt height, or muscularis propria (Fig. 1D, 1E).

Conclusion: Spring-mediated distraction enterogenesis is successful in porcine ileum with springs of varying diameters resulting in comparable structural changes within the intestine. A smaller-diameter spring is as effective as a larger-diameter spring in lengthening ileum.

Figure 1. Splenorenal shunt in a 2-year-old child with biliary atresia. Left renal vein was ligated intraoperatively. PVF increased from 73 to 545 ml/minute after shunt take down.

Figure 1. Significant ileal lengthening is seen in 10mm, 11mm, and 12mm diameter spring compared control (\( *p<0.001, **p<0.05 \)). (B) Thickening of the muscularis propria is demonstrated in all 3 spring diameters when compared to respective control segment with significant lengthening seen in 11mm and 12mm (\( *p=0.008 \)). (C) Increased crypt height is demonstrated in all 3 spring diameters when compared to respective control segments with significant increase seen in 100 mm and 12mm (\( *p=0.036, **p=0.007 \)). (D/E) There is no significant difference in lengthening, crypt height, or muscularis propria thickness between spring segments of different diameters. (F) Comparison if histologic adaption of lengthened ileum according to spring diameter. Micrographs of hematoxylin-eosin stained cross-sections of procine spring-lengthened ileum collected after seven days in vivo. Scale bar represents 200µm, magnification 40x.