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Sutureless anastomosis with covered stents during hybrid surgery for rescue of hypoplastic – distal intrapulmonary arteries

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BACKGROUND: management of hypoplastic and-or deep intrapulmonary arteries in adolescents with pulmonary atresia can be very challenging. We report on the use of interventional techniques during hybrid procedures to make sutureless connections between grafts and diminutive arteries, which are expandable if required.

METHODS: prospective study. Sternotomy; the diminutive artery is identified; stay suture & vascular clip is put at puncture site to mark entry point; the artery is punctured and a wire is advanced in the pulmonary artery; sheath is advanced into pulmonary artery; covered stent is mounted on balloon, vascular graft is slit around shaft; covered stent is deployed sitting across entry point artery, balloon left inflated; graft is slit over proximal end of stent, and tightened distally with a vascular clip; balloon is exchanged for bigger balloon : the proximal stent overlapped by the graft is then dilated into the graft until tight fit; stay suture is now fixed in distal graft to avoid dehiscence; balloon and wire are withdrawn, vascular clamp across the graft to allow “dry” proximal anastomosis of graft as required.

RESULTS: 2 patients , 3 anastomosis:
Patient 1: 13y; left PA thrombosed in infancy, diminutive 2 mm but patent beyond the hilus (retrograde wedge); procedure as above: 0.014” wire; 4/19 mm Jostent Graftmaster to connect the vessel; stent to 5 mm stretch Gore-Tex graft with 6 mm balloon. During follow-up the graft and stent were further dilated up to 6 mm.
Patient 2 : 15 years, bilateral duct with disconnected pulmonary arteries; 2 neonatal modified Blalock-Taussig shunts; right shunt diminutive but left shunt thrombosed; patency of small left PA well beyond hilus. Procedure as above: 0.035” wire in PA; 11F sheath, bilateral Covered CP stent on 12 mm balloon sequentially opened, connected to 14 mm Gore-Tex graft with 16 mm balloon. All anastomoses in time dilatable up to 18 mm.
In all procedures perfect hemostasis was obtained with good clinical result.

CONCLUSION: the sutureless connection with a covered stent allows successful rescue surgery on diminutive distal pulmonary arteries. This type of connection is further dilatable if required.