

Use of an Automated Knot Fastener For Patent Ductus Arteriosus Ligation In the Preterm Neonate

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BACKGROUND

- Surgical treatment of patent ductus arteriosus (PDA) in preterm neonates can be performed either by ligation with a ligature or by applying a metal clip.
- Using **metal clip** carries the **risk** of impingement on adjacent structures such as the left pulmonary artery, recurrent laryngeal nerve or the aorta itself, leading to coarctation of the aorta.
- Suture or tie **ligation** of PDA could be **difficult** because of the small size of the thoracic cavity in premature neonates.

Micro-Knot Fastener

- Automated micro-knot fastener for polypropylene suture with USP sized 6-0, 7-0, or 8-0
- Facilitates secure knot tying in restricted surgical field



Figure 1. Automated micro-knot fastener device

Case

- A 35-year-old primigravida underwent cesarean section at 27 + 6 weeks of gestation due to preeclampsia, delivering a male neonate weighing 870 grams.
- The neonate developed respiratory distress syndrome and was diagnosed with a large PDA, measuring 4mm in diameter.
- At postmenstrual age 30+6 weeks (22 days of life), PDA ligation was performed via left thoracotomy (2.5 cm).
- The PDA was ligated using polypropylene suture 7-0 and automated micro-knot fastener.
- The patient recovered well and was discharged on day of life 92

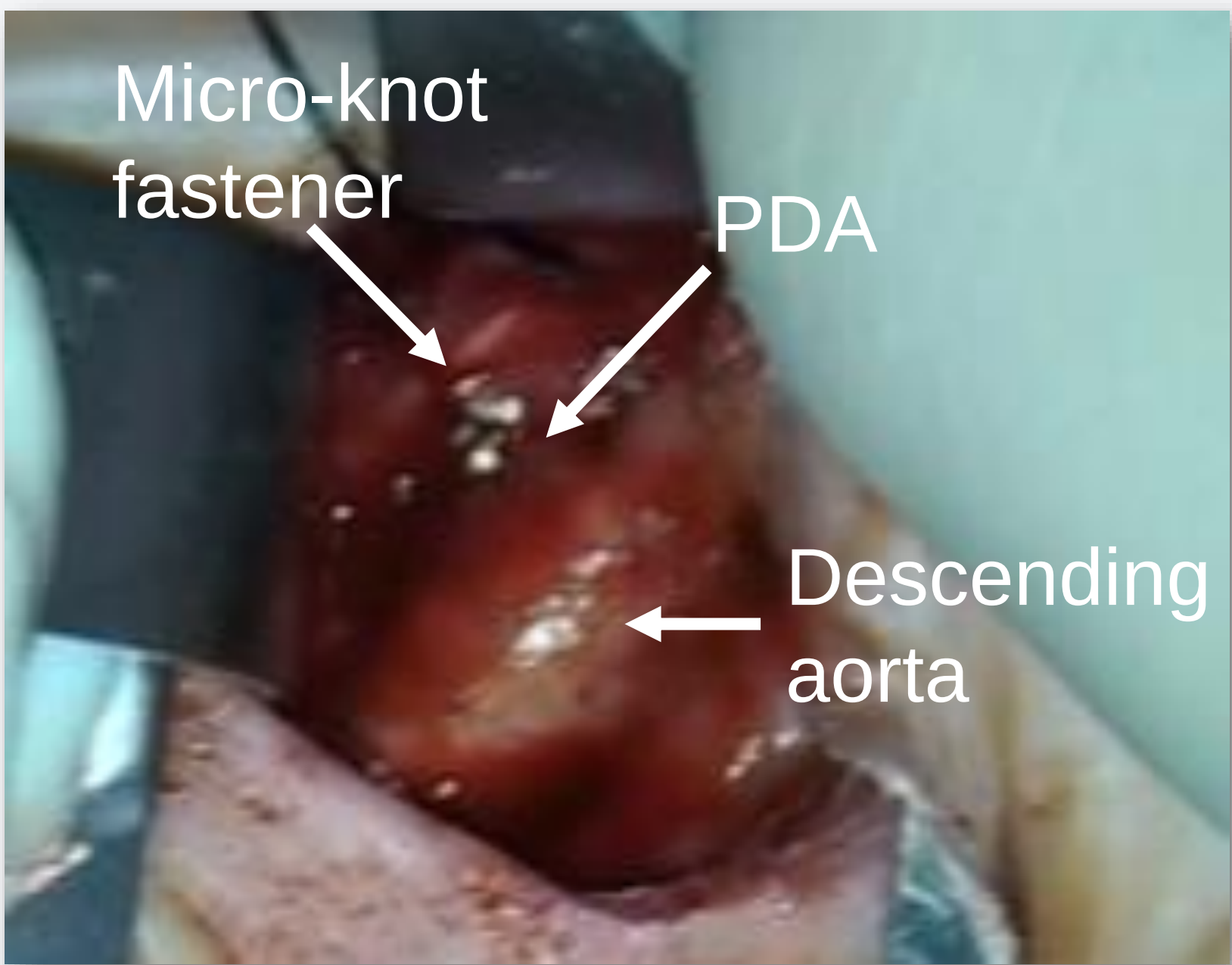


Figure 2. Video clip of PDA ligation using micro-knot fastener

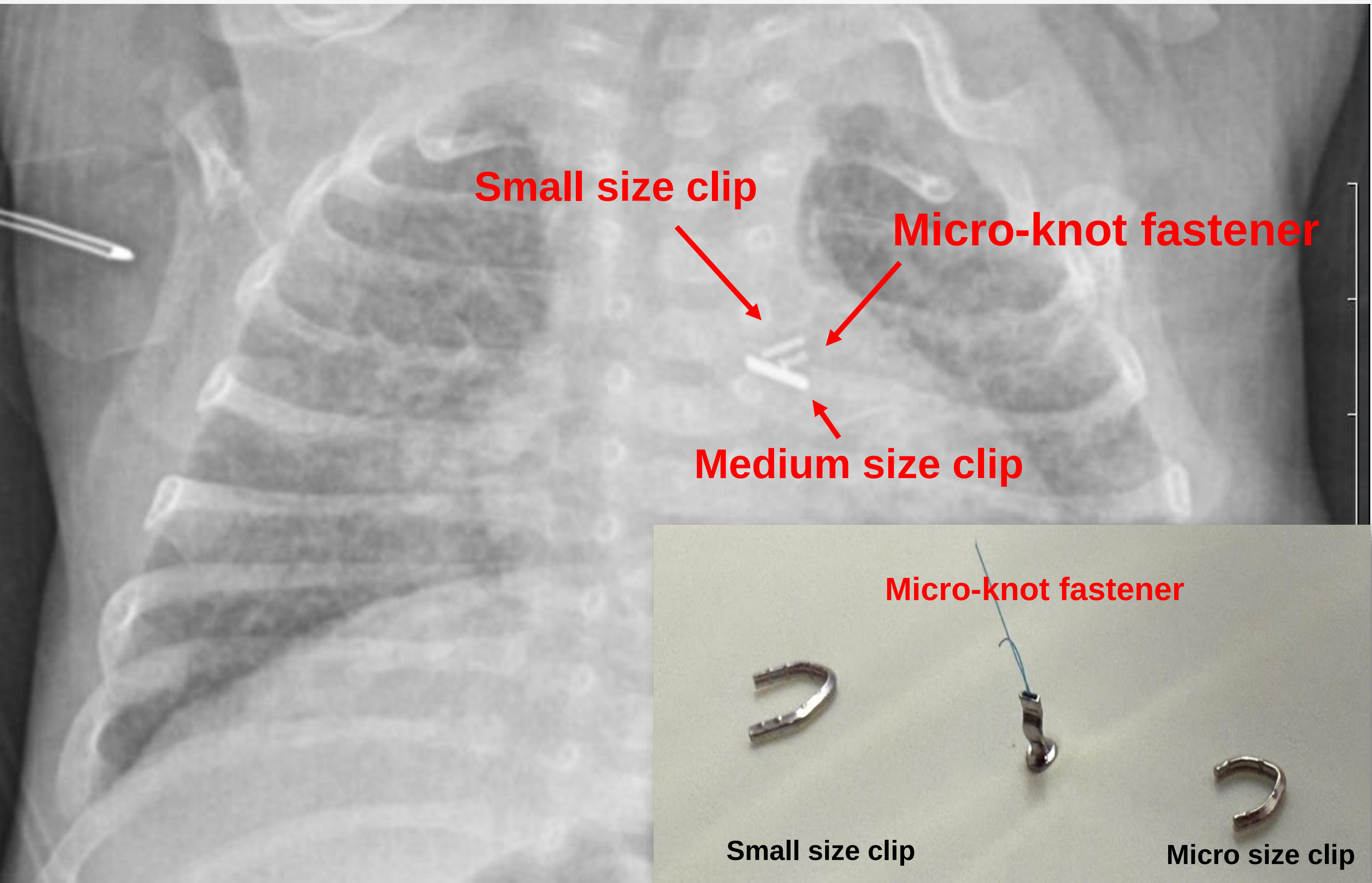


Figure 3. Micro-knot fastener size comparison

Conclusion

- The newly developed **automated micro-knot fastener** device, offers significant advantages in the surgical management of PDA in extremely low birth weight premature neonates, where operative space is severely limited.
- It's utility may be further expanded to other pediatric cardiac surgeries.