Twisted Wire Stent Technique for Delayed Sternal Closure After Congenital Heart Operations

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After congenital heart operations, keeping the sternal edges wide open may require sternal stenting in some extreme cases in which delayed sternal closure is necessary after operation, because sternal edges may compromise cardiac function as a result of the elasticity of the thoracic cage. We describe an easy and safe way for sternal stenting using conventional sternal steel wires.

Technique
The needle of the sternal steel wire is passed through the left part of the sternal edge and the needle is then pulled to bring both steel wire edges to the same level while both edges of the wire are twisted around each other. The length of the twisted part is adjusted to allow the heart to beat without compression by the sternal edges. The needle is passed through the right part of the sternal edge and is pulled until the twisted part of the wire reaches the sternum. Both ends of the wires are rotated, cut, and bent into the periosteum. This is repeated with a second wire. The twisted part of the wires, which are arch shaped, keep the sternal edges apart from each other and away from the mediastinal structures (Fig 1). An oval-shaped piece from a sterile plastic saline bag is cut and sutured to the skin edges using a simple interrupted suture technique. In this way, a tent-like sternal wound covering is created. The wound is covered with iodine-impregnated wound drapes to provide watertight sealing. We applied this technique in a patient weighing 1,900 g with the diagnosis of hypoplastic left heart syndrome who underwent a Norwood stage 1 procedure. We used 2 USP 1 (4 metric) twisted wire stents for this patient (Fig 2). More twisted wire stents with thicker wires may be used for older babies.

Comment
Even seemingly minor contact by the sternal edges may adversely affect cardiac function in some extreme cases that need delayed sternal closure after congenital heart operations. Several techniques have been described for sternal stenting. Jones and colleagues [3] used pieces of semirigid chest tubes. The ends were cut to create notches to fit to the sternal edges. Ganeshakrishnan and coworkers [4] used the same principle with the outer barrel of syringes. Satoh and associates [5] created...
spool-like stents made from the ends of the outer barrels of 2 different-sized polypropylene syringes, and Haenen and colleagues [6] reported the use of compression plates from the orthopedic surgeons for the same purpose. We think that sternal stents should be arch shaped to provide sufficient space for the heart and prevent direct contact of the sternal edges with the mediastinal structures.

We suggest that our technique may be the easiest way for sternal stenting by using conventional equipment. It can be used for children of all ages who need sternal stenting. It is safe and effective and keeps the sternal wound stable during the patient’s overall care.

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References