

# Anterior Laryngotracheoplasty Using Costal Cartilage Graft (Single Stage)

## 8

**Step 6** Suture the graft into the defect using either 4-0 or 5-0 sutures made of polydioxanone (PDS) or Prolene. The benefit of the 4-0 suture is that it is less likely to break. Benefits of the PDS suture are that it has a bit of stretch to it that decreases the likelihood it will break when tying knots, and that it eventually resorbs after several months. The graft can be sutured with horizontal mattress sutures or simple interrupted sutures. We describe here the horizontal mattress suture technique.

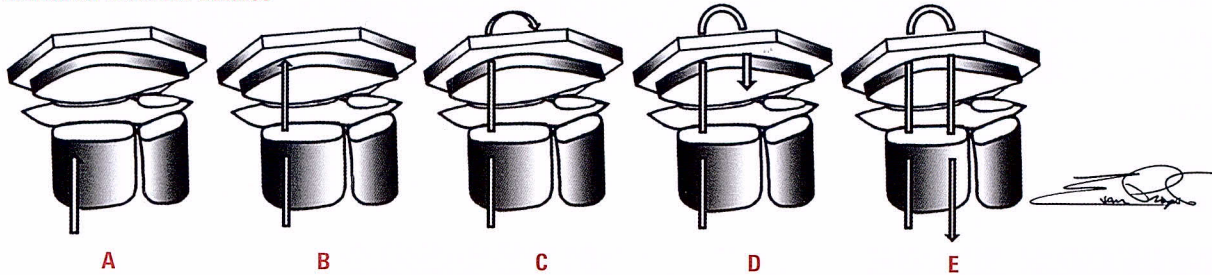
- Pass the needle through the tracheal cartilage from outside to inside, coming out submucosally on the luminal side.
- Pass the suture through the right angle formed by the flange and the graft.
- Exit through the midline of the graft.
- Pass the suture back through the graft and exit through the right angle formed by the flange and the graft.
- Enter the tracheal cartilage submucosally passing from medial to lateral.

Snap the suture ends together. Try to make these suture ends equal in length by adjusting the suture length after each pass through cartilage rather than after passing through all of the cartilages. Pulling the suture through after passing through all cartilages risks tearing the cartilage.

### KEY POINTS

- Suture the graft using 4-0 or 5-0 sutures
- Horizontal mattress or simple interrupted sutures
- Sutures pass through luminal side submucosally
- Sutures pass through right angle formed by graft and flange
- Pull suture through after each pass through cartilage

### Horizontal Mattress Sutures



Proponents of horizontal mattress sutures believe that placing the suture knots laterally allows for the strap muscles to directly contact the new graft anteriorly for better revascularization. If you do not believe this theory, then you may use simple interrupted sutures to suture the graft in place.

Try to minimize the number of needle passes through the cartilage because each needle pass injures the chondrocytes in the graft. Each suture is pulled through until the two suture ends are even and a snap is placed to keep them together (tying the knots as you go makes it difficult to place additional sutures).

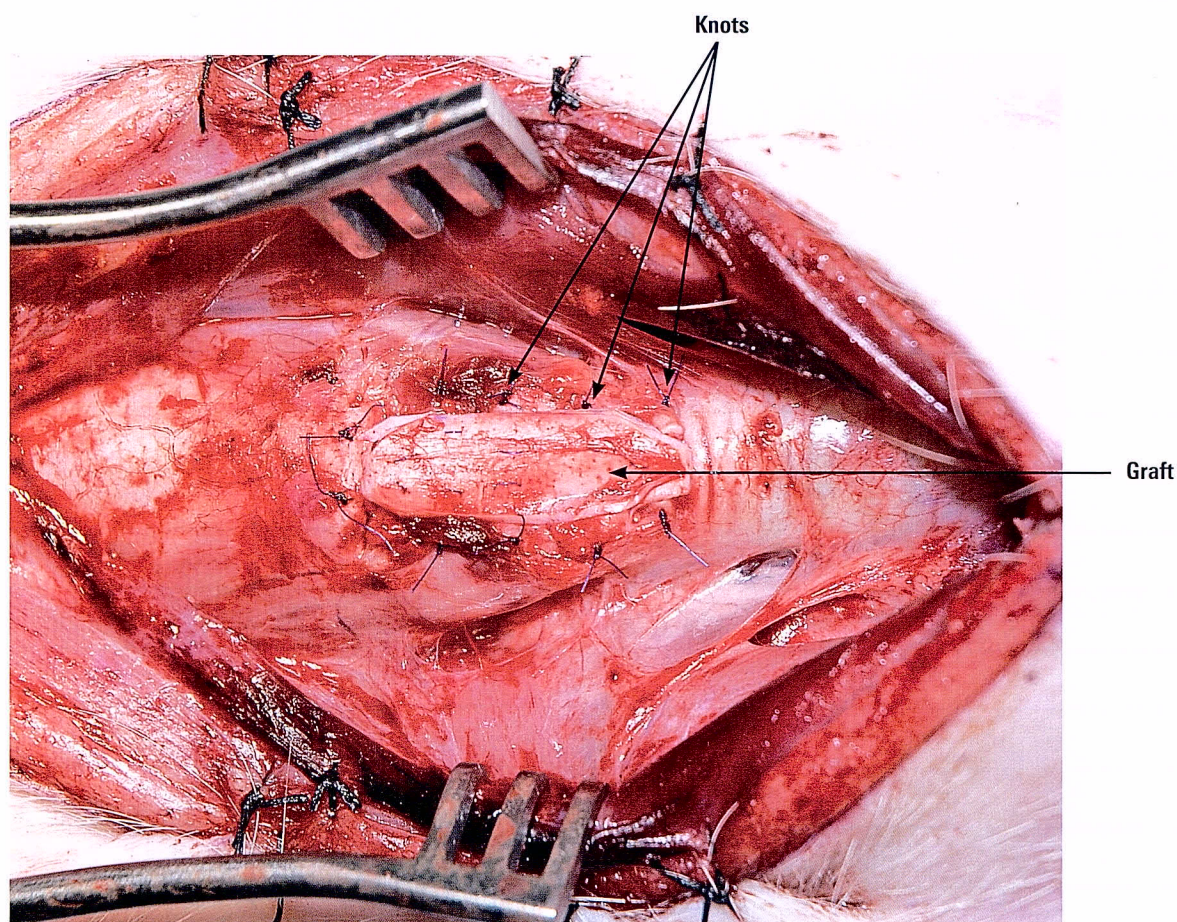
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- Step 7** Place sutures along both sides of the graft as well as superiorly and inferiorly to prevent an air leak. It is important to prevent an air leak in single-stage procedures. In double-stage procedures, the air is more likely to leak around the tracheotomy tube than above it through a gap in the reconstructed airway.
- Step 8** Arrange the “snapped” ends of the sutures neatly from superiorly to inferiorly. As one surgeon tightens each set of sutures from superiorly to inferiorly, the other surgeon allows the graft to “parachute” down into the defect. Tie the sutures with five to six knots.

### KEY POINTS

Place sutures laterally, superiorly and inferiorly  
Parachute the graft down and tie each suture pair with 5 to 6 knots  
Check for air leak



- Step 9** Fill the wound with saline and perform a Valsalva maneuver to check for an air leak (demonstrated by bubbles in the saline). If a leak is present, additional simple interrupted sutures can be placed. *In humans, tissue glue can be used around the edges of the wound. However, we do not recommend wasting tissue glue while practicing on this porcine model.* If there is no leak, suture the muscles closed using 3-0 Vicryl sutures and the skin with a 4-0 running Monocryl suture. Suture a Penrose drain in the lateral corner of the wound with a 2-0 silk suture.