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Case Report

Avoiding granulations and accidental decannulation in paediatric tracheostomy

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ABSTRACT

Tracheal access, accidental deccannulation, peristomal granulation, stenosis and difficult weaning are the laryngologist's dilemma, wherever tracheostomy has been resorted to, in the paediatric age group. These major problems necessitate a modification in the procedure of tracheostomy where 'stay' and 'maturation' sutures are utilized. The stay sutures facilitate a quick midline tracheotomy and the maturation ones minimise parastomal granulation and easy tracheal recannulation.

Keywords: Tracheostomy, Paediatric, Granulations, Decannulation, Sutures, Stay

INTRODUCTION

Limited working space and resemblance visual as well as tactile of the carotid sheath contents, on either side or the oesophagus with feeding tube in situ test the dexterity of the surgeon undertaking tracheostomy in the paediatric subject. Untoward sequel of paediatric tracheostomy are likely within the first week and the commonest two are: accidental decannulation of the tracheostomy tube, seen in 3.3% to 5.6% children and tracheostomy tube blockade with an incidence of 1.8%-8.3%.[1-4] These early noted complications of course can occur at any time later on. The late sequel seen after the first week and that are of concern are the development of peristomal granulation tissue (6.1%-9.7%), suprastomal tracheal granulation tissue (38.7%-40.8%), and persistent tracheocutaneous fistula noted after decannulation (2.5%-35.3%).[1,3-5]Approximately 5.0% to 15.5% is the reported rate of early and 63.5% is of the late complications. 43.0% of which are considered of a major type.[1,2]

To circumvent the issue of accidental dislodgement of the tracheostomy tube and development of granulation tissue 'stay' and 'maturation' sutures have been advocated. The former to facilitate a vertical midline tracheotomy and the latter to mature the infant's tracheostomy stoma.[6-8]

CASE REPORT

A 7 years old child with subdural haematoma following head injury was on endotracheal intubation and ventilator support, Since weaning from the ventilator was not possible after a week he was taken up for elective tracheostomy under general anaesthesia. In a hyper extended neck with a shoulder sandbag propped up position, a transverse incision was given in a skin crease, extending equally on either side of the midline. Sharp and blunt dissection of the subcutaneous planes and the strap muscles was undertaken to expose the pre tracheal fascia which was incised and the tracheal rings were delineated (Figure 1).

Second and third rings were identified and a vertical suture was passed around them on either side of the midline. The sutures (stay sutures) were pulled up to lift the trachea (Figure 2) and a vertical incision was given in the midline to expose the endotracheal tube. The right and left edges of the trachea were approximated to the skin of that side and sutured to the corresponding side (Figure 3). A number 6 cuffed tracheostomy tube was inserted. These sutures (maturation sutures) facilitated quick insertion of the tracheostomy tube in the post-operative period in the paediatric ICU and no granulation tissue was seen (Figure 4).

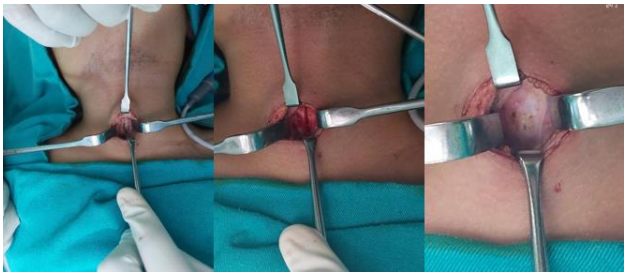

Figure 1: Exposed pre tracheal fascia which was incised and the 2-5 tracheal rings delineated.

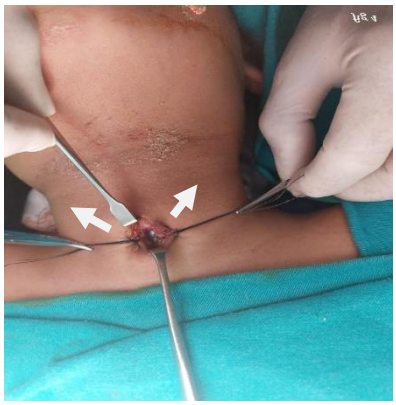

Figure 2: Stay sutures (arrows) placed on either side of a vertical midline tracheotomy incision.

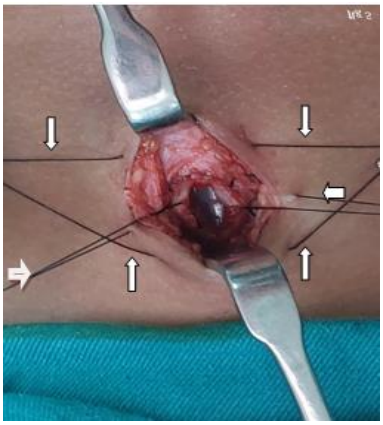

Figure 3: Final formal stoma with two stay (horizontal arrows) and four maturation sutures (vertical arrows) in place.

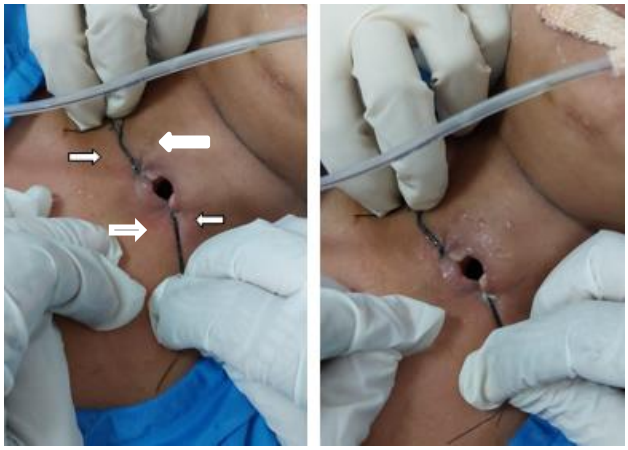

Figure 4: Post-op in ICU with final formal stoma with four maturation sutures in place (arrows).

DISCUSSION

The advocated tracheostomy incision in the paediatric age group is a midline vertical incision given between two 'stay' sutures passed on either side and with traction applied on both sutures to pull up the trachea to facilitate this intervention. These two sutures are taped to the neck and assist in the insertion and change of the tracheostomy tube later, where there is probability of loss of the tracheostome in the usually uncooperative child. The maturation sutures applied on the inferior and superior ends of the vertical incision as well as on the lateral sides, approximate the tracheal edges to the skin margins and the thereby obliterate any dead space circumferentially. These sutures thereby 'mature' the tracheostome (Figure 5).

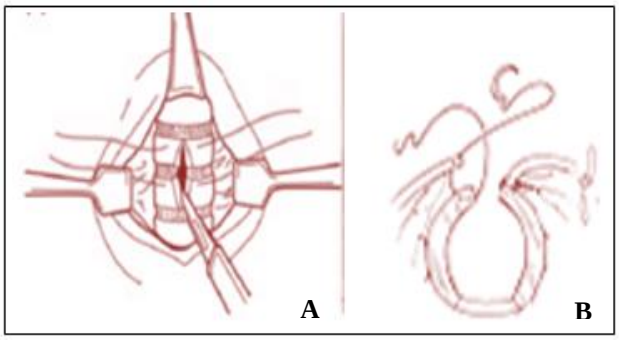

Figure 5: Schematic illustration of stay sutures and maturation sutures placed (A) on either side of a vertical midline tracheostomy incision; and (B) stitched to the skin edge of either side.[13]

The inferior maturation sutures are the most important and are placed between the inferior end of the vertical tracheal slit and the inferior skin edge; they obliterate the space between the trachea and the skin and prevent formation of a false tract when inserting the tracheostomy tube. Stay sutures are typically placed on either side of the vertical incision at the time of a surgical tracheostomy in a child They are taped on the anterior chest wall and labelled

appropriately as 'right' and 'left' (Figure 6). Gentle upward retraction of the stay sutures allows for rapid identification of the newly created tracheostoma in the event of an accidental decannulation, allowing fast replacement of the tube. The sutures are typically removed at the time of the first postoperative tracheostomy tube change.

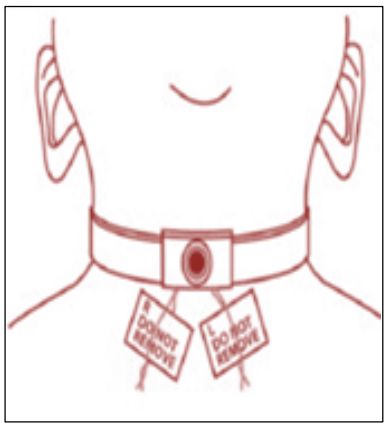

Figure 6: Stay sutures taped on the anterior chest wall and labelled appropriately as 'right' and 'left'.[13]

Controversy does exist with regard to tracheotomy in the paediatric individual as some suggest not to suture the skin edges to the tracheal cartilage, while some advice otherwise.[6,9,10] The latter strongly support stoma maturation to reduce the likelihood of is peristomal granulation tissue.

Potential risk of persistence of tracheocutaneous fistula following decannulation.in the stoma maturation group is suggested by some.[8] Global evidence exists on the modalities to achieve a mature paediatric tracheostome and its utility in avoiding accidental decannulation as well as exuberant para-stomal granulations.[6-8]

Park et al 149 paediatric tracheostomy series reported, showed 59.1% with a mature stoma, and in them there was a markedly reduced incidence of accidental early decannulation.[10]

Modalities to achieve a mature tracheal stoma at different centres are as: a four quadrant or vertical skin flaps approximated and sutured directly to the cartilage of the trachea, an inferiorly- based cartilage flap sutured to the skin (the Bjork flap, and a starplasty procedure where 4 skin flaps are intercalated among 4 tracheal cartilage flaps following the ideology of a Z-plasty.[8,11]

Retrospective studies on tracheostomies in the paediatric age group have documented, that stoma maturation reduces the morbidity of early accidental decannulation without any significant increase in the rate of tracheocutaneous fistula formation.[10] Moreover it is convenient, in children with matured stomas to replace the tracheostomy tube if accidental decannulation occurs.[10]

On the contrary a study, reported increased stomal granulation tissue in Bjork flaps but without a proportional increase in complications associated with elective decannulation, such as tracheocutaneous fistula formation, when compared with complication rates reported in the literature.[7] Ruggiero et al reported 168 member survey among the American Society of Paediatric Otorhinolaryngology surmised usage of stay sutures in 94% as a routinue.[12]

In our paediatric patient we used the stay sutures to pull up the trachea and for easy tracheal cannulation. These were passed through the skin and loosely taped on either side, and retained for the time being. They were not cut on day two. But rather were cut once there was stomal maturation, at the skin- mucosal edge guided by the maturation sutures. Moreover we only applied the lateral maturation sutures as on applying traction on them, could also occlude the dead space superior and inferior to the vertical tracheotomy. This was a slight modification where sutures are even suggested at the upper and lower ends of the tracheal incision.

CONCLUSION

Sutures incorporated in the paediatric tracheostomy protocol, provide quicker intraoperative access to tracheal lumen and maturation sutures obliterate paratracheal dead space with smoother ICU tracheal recannulations.

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