A Novel Approach to Tracheocutaneous Fistula Closure

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ABSTRACT

INTRODUCTION

RESULTS

DISCUSSION

OBJECTIVES:
1. Describe a novel, three-stage approach to closure of a large tracheocutaneous fistula (TCF) and augmentation of an adjacent area of tracheal stenosis.
2. Present pre-, intra-, and post-operative photographs to illustrate surgical technique.
3. Discuss postoperative patient care considerations.
4. Review other techniques described for similar defects.

METHODS: Case report of patient receiving treatment from May 2010 to present. The patient presented with a 1.4 by 1.6 cm TCF and adjacent tracheal stenosis. This was repaired in a three-stage approach culminating in radial forearm free flap (RFFF) with banked conchal cartilage and buccal mucosal graft for tracheal closure.

RESULTS: This case resulted in successful closure of a 1.4 by 1.6 cm TCF in a previously irradiated patient. The initial stage involved implanting a conchal cartilage graft in the left radial forearm. During the second stage a buccal mucosal graft was utilized to cover the conchal cartilage graft after removing the hair-bearing skin. The third stage involved transfer of the RFFF with cartilage and mucosal graft for closure of the TCF. The patient was extubated in the operating room following reconstruction. Straining and speaking were avoided in the immediate postoperative period. Pulmonary expansion was discouraged. Drains were removed individually when output became minimal. The patient had no issues with breathing, speaking, or wound healing immediately or at six months postoperatively.

CONCLUSIONS: Large TCFs in previously irradiated patients present a unique surgical challenge. This case illustrates successful closure of an extensive TCF involving anterior trachea and partial bilateral sidewalls. The unique graft allowed for structural support with hairless mucosal lining on a fasciocutaneous flap. This surgical technique and postoperative management strategy can be considered in patients who present with similar TCFs.

REFERENCES

Various methods have been described for closure of large TCFs. As early as 1934, Jackson and Babcock described using a lined bidepicate flap reinforced with conchal cartilage for closure (1). Several subsequent case reports and case series have described various techniques involving different types of flaps, sometimes combined with cartilage use for structural support (2-4). All of these techniques had small sample sizes with variable follow-up. Whether the patient had been previously irradiated was not always discussed. Our technique represents a novel approach in a previously irradiated patient who had undergone multiple neck surgeries prior to TCF closure. The banked mucosa-lined cartilage served as a framework for structural support of the trachea. The RFFF provided a tissue barrier and additional support between the tracheal closure and skin. In the initial postoperative period, stress on the tracheal anastomosis was minimized by limiting straining and speaking. Forceful coughing was discouraged, and pulmonary expansion was avoided. These restrictions helped promote wound healing without fistula formation.

Large TCFs in previously irradiated patients present a unique surgical challenge. This case illustrates successful closure of an extensive TCF involving anterior trachea and partial bilateral sidewalls. The unique graft allowed for structural support with hairless mucosal lining on a fasciocutaneous flap. This surgical technique and postoperative management strategy can be considered in patients who present with similar TCFs.

Figure 1. The TCF defect included the entire anterior tracheal wall and a portion of the bilateral sidewalls (a). A bronchoscopic view (b) shows the TCF with an endotracheal tube passed through it. Proximal tracheal stenosis is evident.

Figure 2. The conchal cartilage covered with buccal mucosa and implanted in the radial forearm shown prior to the start of stage three (a). The RFFF with the mucosa-lined cartilage graft and skin paddle following harvest during stage three (b and c).

Figure 3. The RFFF was anastomosed to the right superior thyroid artery and external jugular vein. The mucosa-lined cartilage was positioned over the tracheal defect and secured (a and b). The subcutaneous tissue and skin of the RFFF served as additional tissue support in final wound closure. Drains were placed in the neck (c).

Figure 4. The wound at six months postoperatively. The TCF is closed completely and wound is well-healed.