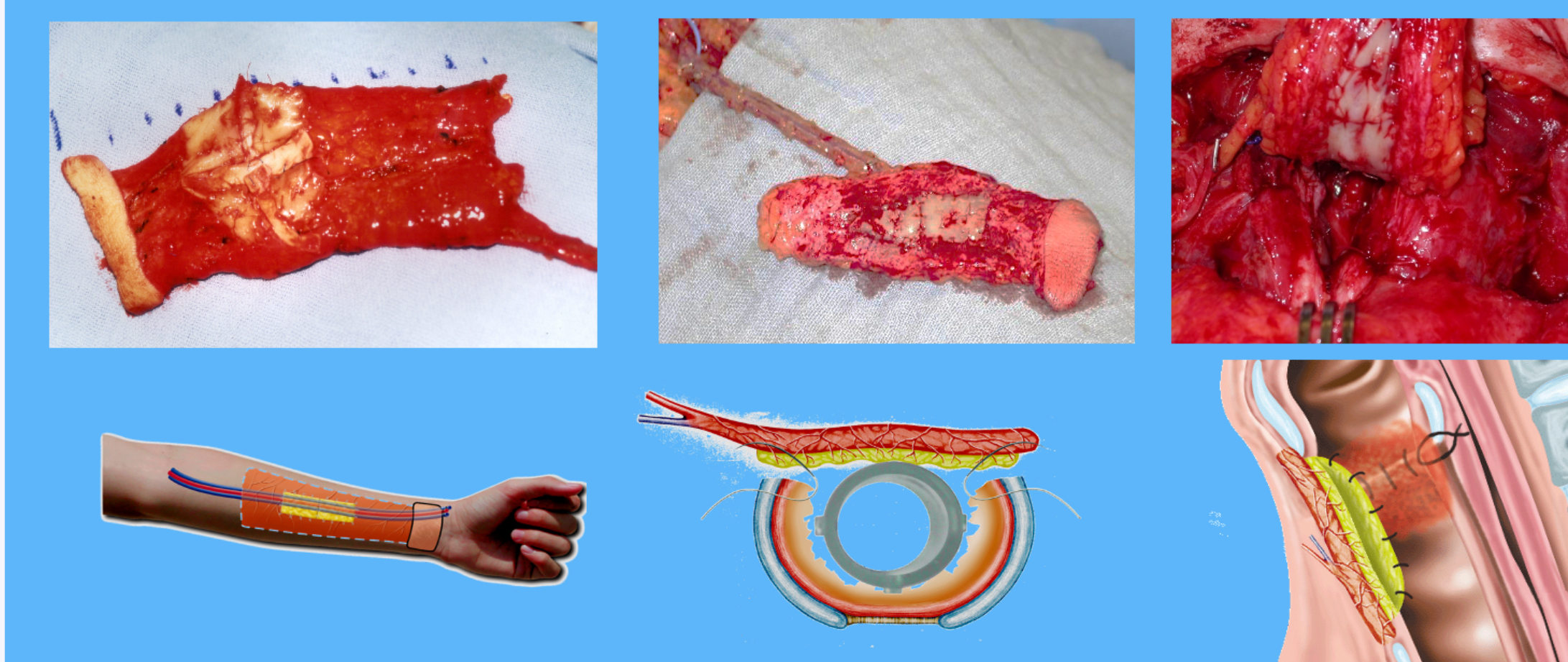


Reconstruction of Long Trachea Defects by Trachea Allo-transplantation with Cessation of Immunosuppression. Learning Curve after 9 cases.

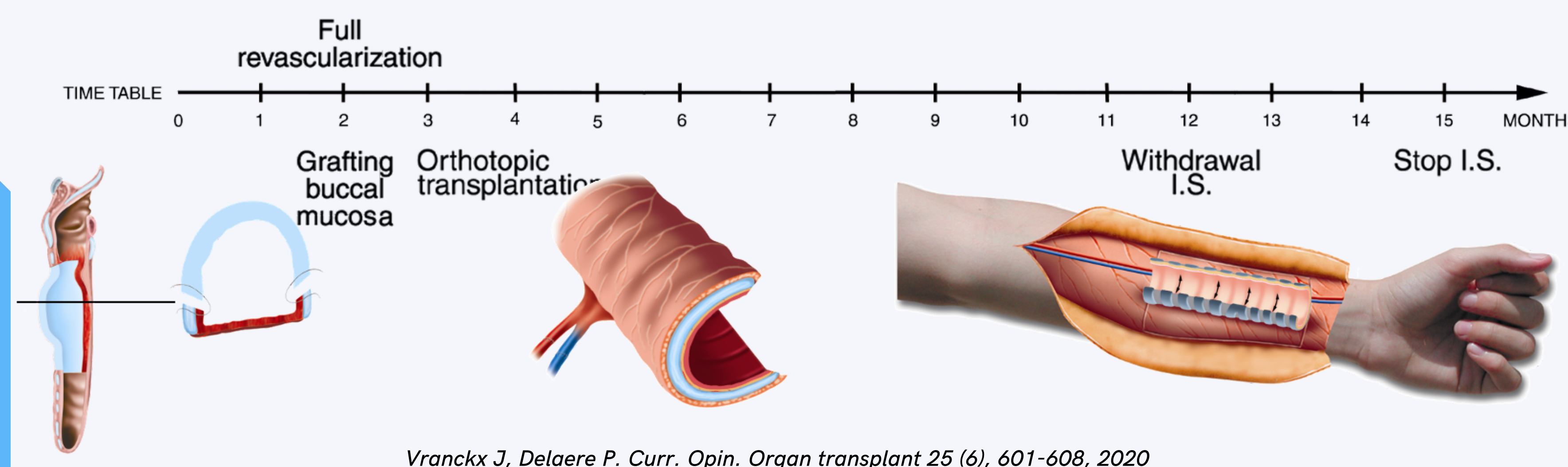
Winston Wittesaele MD; Ernest Schouppe MD; Pierre Delaere MD, PhD*; Jan Jeroen Vranckx MD, PhD.
Dept of Plastic Surgery & *Dept of ENT, KU Leuven University Hospitals, Leuven, Belgium.

Introduction

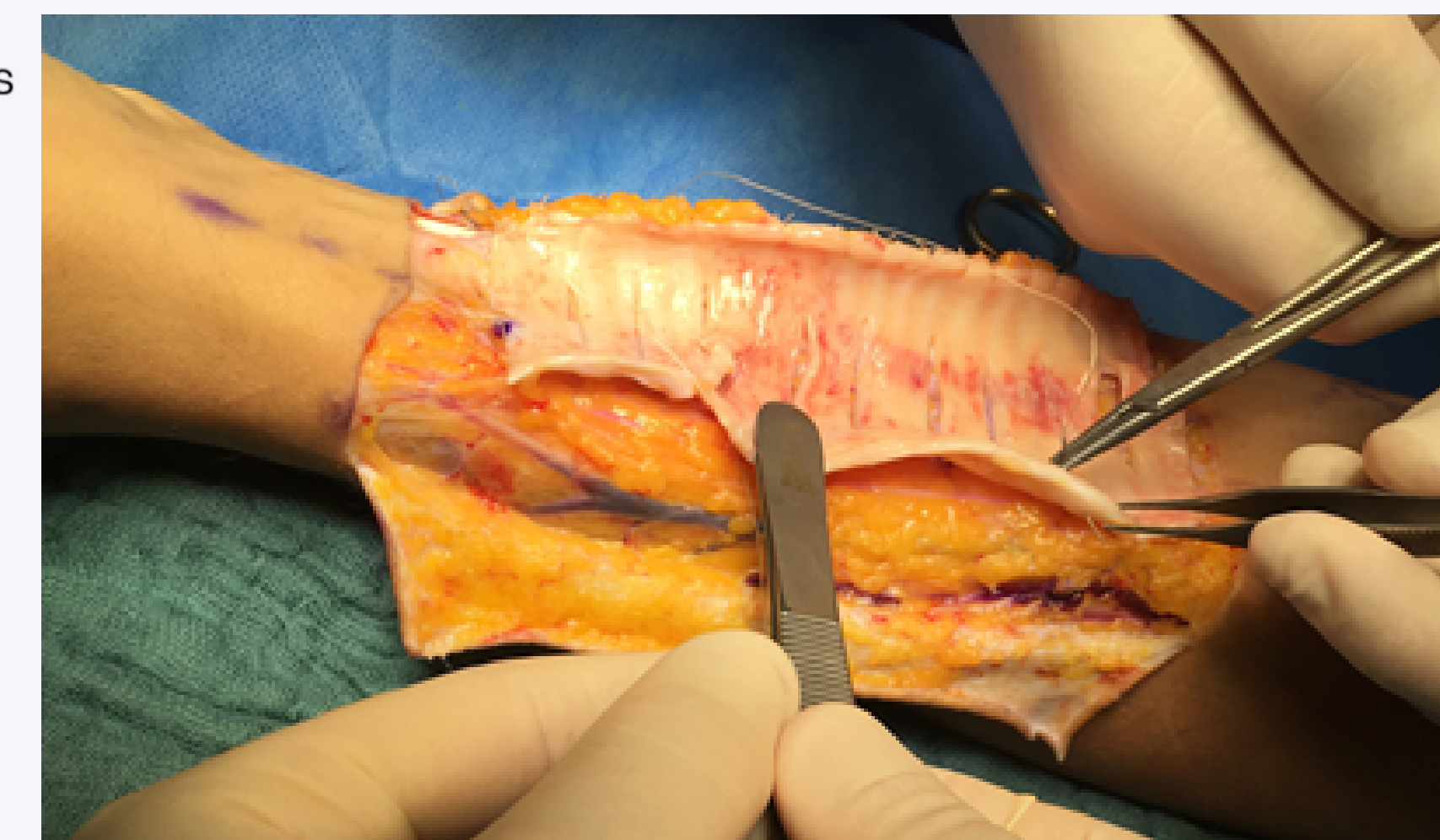
The trachea is an enigmatic organ due to its complex morphology and definitive treatment of defects are challenging. Reconstructive options largely depend on the remaining structural cartilaginous support around the defect. For short tracheal defects, we have moved from a 2-stage cartilage-prelaminated radial forearm flap, towards a 1-stage mucosa-laminated flap to restore the hollow mucosa-lined lumen. Alternatives are medial condylar flaps or cartilage-loaded fascia flaps. For long airway defects there are no authentic autologous donor tissues available to restore the mucosa-lined elastic cartilaginous framework consistently. When autologous options are not stable over time, a useful and fascinating approach for difficult-to-repair long airway defects is tracheal allotransplantation.



Vranckx JJ, Delaere P et al, J. Reconstr. Microsurg 2014



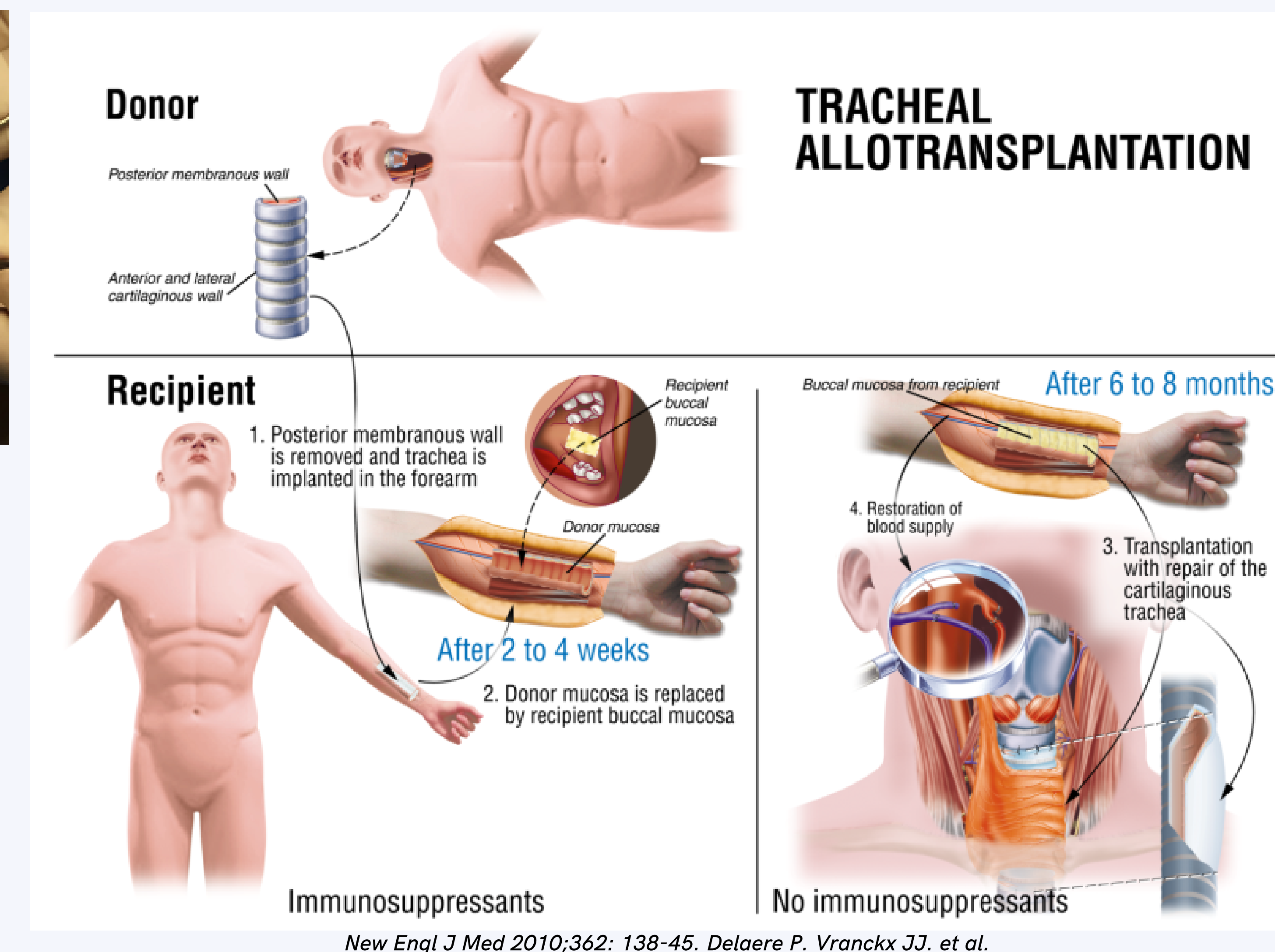
Vranckx J, Delaere P. Curr. Opin. Organ transplant 25 (6), 601-608, 2020



First stage prefabrication of allogenic trachea. Incomplete incisions of the intercartilaginous ligaments are made to promote ingrowth of recipient blood vessels into the submucosal space of the transplant.

Results

- The average age at transplantation was 41 yrs (n=8). Patient 9 is between stage 1 & 2.
- The indication for allo-transplantation was posttraumatic stenosis in 7 cases, lowgrade chondrosarcoma in one case and an idiopathic stenosis in another case. Tracheal allo-transplantation at the time of tumor resection is possible only for low-grade malignancies and not for other malignant tumors because of the risk of tumor progression in the pretransplant immunosuppression period.
- The 3-year survival rate was 100% (n=6).
- Four patients were tracheostomy dependent postoperatively (n=8). Two required an urgent intervention due to re-stenosis, the others remained dependent after the allo-transplantation.
- Mean follow-up was 67 months [2;114].



New Engl J Med 2010;362: 138-45. Delaere P. Vranckx JJ. et al.

Conclusions

- Restoration of a long-segment circumferential tracheal defect remains an unmet challenge. Future reports on this subject should be required to provide thoroughly documented visual evidence of outcomes to reduce confusion surrounding tracheal replacement and to prevent future scandals like those seen previously in the tracheal regeneration story.
- Vascular induction of donor mucosal capillaries by recipient blood vessels around the transplanted tissue may occur through the intercartilaginous ligaments. Therefore, the most important adaptation was to allow for growth of recipient blood vessels in the submucosal space of the graft. These incisions disrupted the barrier for angiogenetic outgrowth of recipient vessels and enabled ingrowth of recipient vessels into the submucosal space of the transplant.
- Another important factor was the implantation of a recipient buccal mucosal graft in the central portion of the transplant. Buccal mucosa was chosen because respiratory mucosa is difficult to handle as a free graft. After ceasing immunosuppressive therapy, all donor respiratory epithelium disappears, and the buccal mucosal graft progressively grows and recovers part of the surrounding transplant's inner lining.
- With the intercartilaginous incisions and the recipient buccal mucosa, immunosuppressive medication could be safely tapered and stopped 9 to 12 months after forearm implantation.
- The ingenious revascularization procedure, along with carefully timed immunosuppression, takes advantage of these unique properties so as to preserve the tracheal cartilage tissue and structure, while noncartilaginous tissues are replaced by recipient tissues. In all patients immunosuppressive therapy could be permanently stopped.
- Long term stability of the generated neotrachea remains a challenge. Future focus consists of introducing respiratory epithelium as inner lining.