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COMMENTARY

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Use of Human Chorion and Amnion Membranes during Neck Surgery

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Description

The most dreaded neck surgery complication for both patients and surgeons has always been temporary or permanent damage to the recurrent laryngeal nerve. Although the degree of the dissection and the surgeon's experience directly affect the incidence of nerve injury, it is predicted to affect approximately 175,000 patients annually in the US at a significant social cost. The rate of nerve injury has not decreased over the past 50 years, despite several technological advancements in operating rooms. The development of nerve-monitoring endotracheal tubes was intended to reduce the rate of nerve injury, but the vast majority of published studies show no decrease and, on rare occasions, an increase when the surgeon places too much emphasis on the tube and insufficient emphasis on the finer details of the dissection. Despite the fact that nerve monitoring is deemed standard of care for many neck and thyroid procedures, surgeons typically don't think the technology helps and have resorted to utilising it only to prevent the most common malpractice.

We have a tonne of expertise dissecting the neck and have unmatched experience with the recurrent laryngeal nerve being the world's largest thyroid/parathyroid surgical centre. We are not immune to nerve injuries, albeit they usually only affect our hands temporarily and only endure for around three months on average. The nerve is almost always fully intact after surgery, but it sometimes develops a neuropraxia that prevents the nerve impulse from successfully propagating. It is impossible to overstate the expense of this injury, even if it is temporary. For the patient, the management doctor, and the others who work in his or her office, it is a serious issue.

A new way of thinking about biologics

We started considering neuropraxia as a wound injury and questioned whether we could use some of the novel biologic membranes that have transformed the treatment of chronic wounds. For many non-healing diabetic ulcers and other wounds where the normal wound healing cascade has been impeded for a variety of reasons, human amnion/chorion membrane (HACM) has become the standard of therapy. Since many years ago, it has been known that the human amniotic membrane contains physiologically active proteins that may be helpful for patients with various chronic wound issues. Numerous studies in the literature have demonstrated that the HACM contains approximately 100 different growth factors, cytokines, anti-inflammatory mediators, and other proteins that are then secreted into the tissues to which it is applied.

Mothers give HACM, which is taken from live C-section new-borns and processed to either contain either the amniotic membrane or both the amnion and chorion layers. It is then cut into sheets that typically range in size from 3 × 3 cm to 10 × 15 cm after being dehydrated, sanitised, and sliced. Amnion is difficult to work with, once it has been rehydrated because it is so thin (usually only one or two cell layers thick). When applied to a wound, the amnion/chorion mixture becomes more transparent after being rehydrated. It is thicker, like wax paper, but still translucent. Since the tissue is immune privileged and lacks antigenic characteristics, any unfavourable reactions to the substance are essentially unknown and unreported.

The incidence and duration of nerve damage after thyroid cancer surgery were both reduced by HACM administration. The data showed that the median time

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to recover dropped from 4.5 weeks to 10 days, supporting our hypothesis that the presence of growth factors and anti-inflammatory drugs would minimise the length of nerve injury. Since HACM is known to exude IL1-ra, a potent anti-inflammatory and anti-scarring compound (among others), it is possible that, rather than promoting healing, the immediate suppression of inflammation and the attraction of inflammatory cells are contributing to the overall decline in injury incidence. We came to the conclusion that the physical barrier function of the HACM may be significantly contributing to the prevention of nerve injuries rather than hastening their regeneration as we compared our results with those of other studies in the literature. The incidence and duration of transient nerve injury were significantly reduced when human amniotic membrane was applied to 1000 consecutive, fully dissected (>3 cm), recurrent laryngeal nerves during thyroidectomy as compared to historical controls who underwent nerve monitoring but did not use amniotic membrane as a protective covering and source of biologic proteins.