Ribs

Sutureless cartilage graft laryngotracheal reconstruction using fibrin sealant.

Authors: Kang DR, Leong H, Foss R, Martin P, Brooker CR, Seid AB

Publication Date: 1998

Abstract:

OBJECTIVE: To determine whether fibrin sealant can replace suture as a means of holding a cartilage graft securely in the trachea.

DESIGN: Randomized blinded control study comparing the use of fibrin sealant vs sutures in laryngotracheal reconstruction in ferrets. We compared results at 7 and 30 days.

SUBJECTS: Forty ferrets randomized into 2 groups of 20: fibrin sealant and sutures. Within each group, half were studied at 7 days and the rest at 30 days. No ferrets were withdrawn from study because of adverse effects of the intervention.

INTERVENTION: A carved costal cartilage graft was placed in the anterior cricoid split incision, and was secured with either fibrin sealant or sutures. All animals were extubated after recovery from anesthesia. Specimens were examined grossly and histologically.

RESULTS: All animals survived until humanely killed. The pathologist, unaware of the groupings, measured lumen expansion in millimeters, cartilage graft migration, mucosal in-growth, degree of inflammation, graft integration, and graft viability. The fibrin sealant group had statistically significant ($P<.05$) better results in mucosal in-growth. In no categories was the suture group better than the fibrin sealant group. In comparing 7-day with 30-day results, the 30-day group had significantly

better results in inflammation and graft viability.

CONCLUSIONS: Fibrin sealant can be used in place of sutures with improvement in mucosal growth in costal cartilage laryngotracheal reconstruction in the experimental animal model. Use of fibrin sealant (instead of sutures) may result in less surgical trauma and edema, less surgical time, and faster recovery.

High Output Chylous Fistula Post First Rib Resection

Authors: Almdahl SM, Hotvedt R, Larsen U, Sorlie DG

Publication Date: 2020 Feb:63:455.e1-455.e5.

Abstract:

We present a patient who developed high output chyle leak post left first-rib resection for neurogenic thoracic outlet syndrome. The persistent high output chylorrhea was refractory to 3 surgical reexplorations attempting to ligate leaking branches, bed rest, nonfat diet, parenteral nutrition, octreotide administration, and vacuum-assisted closure (VAC) therapy. In addition, she developed hypovolemia, hyponatremia, and hypoalbuminemia. Control of the chylous fistula was achieved by reattaching the sternocleidomastoid muscle laterally to protect the phrenic nerve and brachial plexus in order to redirect chyle to the medial portion of the neck incision site. This was supported by the application of fibrin sealants in combination with VAC therapy. The patient was discharged after a 27-day hospital stay with complete resolution of her chylous fistula prior to discharge.

A Hydrogel Construct and Fibrin-based Glue Approach to Deliver Therapeutics in a Murine Myocardial Infarction Model

Authors: Almdahl SM, Hotvedt R, Larsen U, Sorlie DG

Publication Date: 2015 Jun 14

Abstract:

The murine MI model is widely recognized in the field of cardiovascular disease, and has consistently been used as a first step to test the efficacy of treatments in vivo. The traditional, established protocol has been further fine-tuned to minimize the damage to the animal. Notably, the pectoral muscle layers are teased away rather than simply cut, and the thoracotomy is approached intercostally as opposed to breaking the ribs in a sternotomy, preserving the integrity of the ribcage. With these changes, the overall stress on the animal is decreased. Stem cell therapies aimed to alleviate the damage caused by MIs have shown promise over the years for their pro-angiogenic and anti-apoptotic benefits. Current approaches of delivering cells to the heart surface typically involve the injection of the cells either near the damaged site, within a coronary artery, or into the peripheral blood stream. While the cells have proven to home to the damaged myocardium, functionality is limited by their poor engraftment at the site of injury, resulting in diffusion into the blood stream. This manuscript highlights a procedure that overcomes this obstacle with the use of a cell-encapsulated hydrogel patch. The patch is fabricated prior to the surgical procedure and is placed on the injured myocardium immediately following the occlusion of the left coronary artery. To adhere the patch in place, biocompatible external fibrin glue is placed directly on top of the patch, allowing for it to dry to both the patch and the heart surface. This approach provides a novel adhesion method for the application of a delicate cell-encapsulating therapeutic construct.

"Undercutting of the corresponding rib": a novel technique of increasing the length of donor in intercostal to musculocutaneous nerve transfer in brachial plexus injury

Authors: Almdahl SM, Hotvedt R, Larsen U, Sorlie DG

Publication Date: 2023 Jun;37(3):453-456.

Abstract:

Intercostal nerves (ICN) are often utilized as donors for various neurotization procedures in brachial plexus injuries. ICN to musculocutaneous nerve (MCN) transfer is usually a standard in pan brachial plexus injuries, in order to restore flexion at the elbow. A tensionless co-aptation of the donor-recipient nerves often necessitates either a distal dissection of the ICNs where the number of fascicles is rather low or a proximal dissection, often at the cost of dissection of the serratus anterior digitation with a risk of later fibrosis and adhesion. We report two cases of pan brachial plexus injuries where ICN-MCN transfer was performed to restore elbow function. These patients underwent clinical and electrodiagnostic evaluation before surgery. We used the standard technique of harvesting ICNs 3-5, with our technical modification of "undercutting of rib" for increasing the donor length. The procedure was applied in two patients with pan brachial plexus injury (mean age = 23). Mean duration since the injury to surgery was ten months. Both patients underwent tensionless anastomosis with a combination of suture and fibrin glue co-aptation. While one patient had some improvement in elbow flexion, another one was under active rehabilitation protocol during follow-up. We found that undercutting of the ribs near serratus digitations can allow mobilization of the ICN from its groove, which in turn lengthens the donor nerve length without violating the serratus anterior digitations and without too anterior dissection of the nerve. It can be a viable option when a tensionless co-aptation at the axilla is otherwise not feasible intraoperatively.

Correction of enophthalmos with rib bone segment and diced cartilage grafts

Authors: Almdahl SM, Hotvedt R, Larsen U, Sorlie DG

Publication Date: 2012 Nov;23(6):1917-20.

Abstract:

We introduce our experiences of correcting enophthalmos with a rib bone segment graft and diced cartilage graft simultaneously.The affected orbit was exposed through a subcilliary incision, a medial brow incision, and a lateral brow incision. The periorbita was carefully dissected from the bony orbit circumferentially. The affected area was examined, and the size and shape of the bone graft were determined. A 5-cm incision was made at the 7th rib-cartilage junction, and the 7th and 8th ribs and costal cartilage was harvested as needed. The donor site was closed. The harvested rib bone segment was molded with a bender to fit the defect, and the cartilage was diced into 2 × 2 × 2-mm cubes. The diced cartilage was inserted into the subperiosteal space, and fibrin glue was sprayed.Nine patients (3 male and 6 female subjects) were operated on, and the average follow-up period was 9 months. On the exophthalmometry, the preoperative difference was 4.6 ± 1.7 mm, and this improved to 1.4 ± 0.8 mm at 3 months postoperatively. The average improvement was 3.2 mm.It is thought that the correction of enophthalmos by the combined use of a rib bone segment and cartilage grafts is very effective because bone and cartilage have complimentary effects in maintaining the globe's position.

A novel autologous scaffold for diced-cartilage grafts in dorsal augmentation rhinoplasty

Authors: Almdahl SM, Hotvedt R, Larsen U, Sorlie DG

Publication Date: 2011 Aug;35(4):569-79.

Abstract:

Background:Diced-cartilage grafts have been used for dorsal nasal augmentation for several years with good results. However, compounds such as Surgicel and temporalis fascia used as a wrap have inherent problems associated with them, predominantly inflammation and graft resorption. An autologous carrier could provide stabilization of cartilage grafts while avoiding the complications seen with earlier techniques. Methods:In our patients, a malleable construct was used for dorsal nasal augmentation in which autologous diced-cartilage grafts were stabilized with autologous tissue glue (ATG) created from platelet-rich plasma (platelet gel) and platelet-poor plasma (fibrin glue). Results:A prospective analysis of 68 patients, who underwent dorsal nasal augmentation utilizing ATG and diced-cartilage grafts between 2005 and 2008, were included in the study. Although there was notable maintenance of the dorsal height, no complications occurred that required explantation over a mean follow-up of 15 months. Conclusion:The use of ATG to stabilize diced-cartilage grafts is a safe, reliable technique for dorsal nasal augmentation. The platelet gel provides growth factors while the fibrin glue creates a scaffold that allows stabilization and diffusion of nutrients to the cartilage graft.

Sutureless cartilage graft laryngotracheal reconstruction using fibrin sealant

Authors: Almdahl SM, Hotvedt R, Larsen U, Sorlie DG

Publication Date: 1998 Jun;124(6):665-70.

Abstract:

Objective:To determine whether fibrin sealant can replace suture as a means of holding a cartilage graft securely in the trachea. Design:Randomized blinded control study comparing the use of fibrin sealant vs sutures in laryngotracheal reconstruction in ferrets. We compared results at 7 and 30 days. Subjects:Forty ferrets randomized into 2 groups of 20: fibrin sealant and sutures. Within each group, half were studied at 7 days and the rest at 30 days. No ferrets were withdrawn from study because of adverse effects of the intervention. Intervention:A carved costal cartilage graft was placed in the anterior cricoid split incision, and was secured with either fibrin sealant or sutures. All animals were extubated after recovery from anesthesia. Specimens were examined grossly and histologically. Results:All animals survived until humanely killed. The pathologist, unaware of the groupings, measured lumen expansion in millimeters, cartilage graft migration, mucosal in-growth, degree of inflammation, graft integration, and graft viability. The fibrin sealant group had statistically significant ($P<.05$) better results in mucosal in-growth. In no categories was the suture group better than the fibrin sealant group. In comparing 7-day with 30-day results, the 30-day group had significantly better results in inflammation and graft viability. Conclusions:Fibrin sealant can be used in place of sutures with improvement in mucosal growth in costal cartilage laryngotracheal reconstruction in the experimental animal model. Use of fibrin sealant (instead of sutures) may result in less surgical trauma and edema, less surgical time, and faster recovery.

Rib Bone Graft Adjusted to Fit the Facial Asymmetry: A Frame Structure Graft

Authors: Almdahl SM, Hotvedt R, Larsen U, Sorlie DG

Publication Date: 2015 Oct;26(7):2160-2.

Abstract:

The authors introduce the concept of a "frame structure graft" in which a harvested rib bone was adjusted to fit facial asymmetry. On the costochondral junction of the sixth or seventh rib, a 5 cm incision was made. Through a subperiosteal dissection, the rib bone was harvested. Using a reciprocating saw, the harvested rib was scored on its anterior surface as well as its posterior surface with a partial depth at different intervals. The harvested rib bone was placed on the skin surface of the unaffected side of the face and a curvature was created exactly matching that of the unaffected side by bending the bone using a greenstick fracture. Thereafter, the graft was adjusted to conceal the asymmetry of the deficient side. The adjusted "frame structure" was transferred to the defect through the incisions on the affected side, and the "frame structure" graft was placed on the mandible or zygoma. The graft fixation was done externally with at least 2 Kirschner wires (K-wires). From January 2005 to August 2013, a total of 30 patients (13 men, 17 women, mean age 25.6 years) received a frame structure graft. All 30 patients achieved good healing at the operation site without complications. Donor-site morbidity as pneumothorax from the rib bone harvest was not found. Merits of this frame structure graft, the authors think, are that this method could allow a similar curvature to the normal side. In addition, the procedure itself is easy.

Long-term results of rib perichondrial grafts for repair of cartilage defects in the human knee

Authors: Almdahl SM, Hotvedt R, Larsen U, Sorlie DG

Publication Date: 1997;21(5):313-7.

Abstract:

Eighty-eight patients with articular cartilage defects in the knee were treated by perichondrial arthroplasty between 1986 and 1992. An autogenous strip of costal perichondrium was fixed in place with fibrin glue, followed by immobilisation, continuous passive motion, and partial weightbearing. The results were evaluated using the Hospital for Special Surgery Score for knee function, radiographs, arthroscopy and the patient's subjective opinion. The results after a mean follow-up of 52 months were good in 38%, fair in 8% and poor in 55%. Previous drilling or shaving of a defect, concomitant osteoarthritis, older age and a long history of complaints proved to be contraindications. Good results were seen in 91% of isolated defects. Perichondrial arthroplasty can be beneficial in the repair of cartilage defects. It will reduce symptoms in carefully selected cases, and avoid more extensive operations for osteoarthritis.

Thoracic Hemangioma From Rib Presenting as Compressive Paraparesis in a Young Adult: A Treatment Dilemma

Authors: Almdahl SM, Hotvedt R, Larsen U, Sorlie DG

Publication Date: 2015 Nov;40(22):E1198-200.

Abstract:

Study design:A case report. Objective:To describe the presentation of compressive paraparesis as a result of thoracic rib hemangioma in a young adult and its nonsurgical management. Summary of background data:Hemangiomas are rare bone tumors and those arising from rib are rarer. Only about 50 such cases have been reported in literature so far. Methods:A 21-year-old male student, presented to us with a 6-week history of progressive weakness in both lower limbs and loss of bowel bladder control. Patient gave history of being operated for left periscapular tumor treated with wide excision and proven with biopsy to be a hemangioendothelioma (benign but locally aggressive hemangioma variant) a year ago. Results:New radiograph of the chest showed an expansile lesion of left fifth rib and magnetic resonance image showed a tumor of left dorsal thoracic wall with AV malformation causing compressive thoracic myelopathy at T5 level vertebrae. We planned for immediate decompression surgery for spine along with excision of tumor with the help of a thoracic surgeon. However, on preoperative digital subtraction angiography, the tumor was found to be highly vascular with high risk of intraoperative bleeding and morbidity. So, the plan was revised and the patient underwent digital subtraction angiography, followed by embolization by an expert interventional neurosurgeon. The patient showed signs of recovery within a week. Lower limb power improved from grade 2 to 3/5 to grade 4 to 4+/5. The patient became ambulatory with single stick at 3-month follow-up; he was a nonwalker to start with. At 2 years plus follow-up, the patient fully recovered and walks without stick. Conclusion:This unique case brings to light the dilemma a spine surgeon sometimes faces. A case that warranted immediate surgical intervention based on clinical

findings was treated with interventional fibrin glue embolizations with excellent results. Level of evidence:N/A.