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Surgery of the Trachea

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Key words: Tracheal stenoses – laryngeal stenoses – tracheal surgery – tracheal tumor – laryngeal dyspnea.

Schlüsselwörter: Trachealstenosen – Laryngealstenosen – Trachealchirurgie – Trachealtumor – Laryngealdyspnea.

Summary: Background: Surgery of the trachea is one of the noble activity in thoracic surgery because disorders involving the trachea are relatively uncommon and so it is difficult for most surgeon to acquire a large amount of personal experience in this area. Success in tracheal resection does not rely only on technical aspects of the operation and failure can rapidly lead to death.

Methods: The authors performed a general review of all aspects for management of tumoral and nontumoral tracheal or laryngotracheal stenoses. All the different points for controlling to succeed treatment are described: management of acute dyspnea, consideration to the disease process, performing the preoperative evaluation, preoperative preparation, technical aspects of the operation, and management of the post operative care. This review is planned from some relevant articles and the large personal author's experience which is presented.

Results: Good to excellent results in respiratory and voice functions in 97 % of cases. Very long stenosis and laryngeal involvement are the 2 major difficulties.

Conclusion: Tracheal resection anastomosis is a safe operation if all the above mentioned points are achieved.

(Acta Chir. Austriaca 1999; 31: 275–279)

Trachealchirurgie

Zusammenfassung: Grundlagen: Die chirurgische Behandlung von Trachealstenosen tumoraler oder nichttumoraler Herkunft steht im Interessenszentrum der Thoraxchirurgie. Die Seltenheit dieses Leidens ist meist verantwortlich für den Erfahrungsmangel auf diesem Gebiet der Chirurgie, so daß die Lebenserwartung deutlich herabgesetzt wird und selbst die Beherrschung der chirurgischen Technik nicht ausreicht, um befriedigende Resultate zu erreichen.

Methodik: Der allgemeine Überblick der Autoren beinhaltet die Behandlung von Tracheal- bzw. Laryngotrachealstenosen, die benignen oder malignen tumoralen Ursprungs sind. Es werden nicht nur die Aspekte der chirurgischen Techniken, sondern auch die Behandlung eines Notfalls, die unerläßlichen präoperativen Vorbereitungen, der anatomische und funktionelle Zustand und die Operationsleitung beschrieben. Es ist eine Aufstellung der wesentlichen Gesichtspunkte, ausgehend von der persönlichen Erfahrung und einer Übersicht über die Hauptveröffentlichungen zu diesem Thema.

Ergebnisse: Nach Resektion der benignen Trachealstenosen ist der Verlauf in 97% der Fälle gut. Schwierigkeiten bestehen bei Befall des Larynx und im Fall einer ausgedehnten Stenose.

Schlußfolgerungen: Die Ergebnisse der Tracheal- bzw. Laryngotrachealresektion sind ausgezeichnet, wenn die oben genannten Grundsätze beachtet werden.

Die noch nicht erprobten Techniken für einen Ersatz der Trachea werden nur für ausgedehnte Stenosen anwendbar sein, die nicht durch Resektion behoben werden können.

Introduction

Tracheal surgery is generally recognized as a field of high risk activity in thoracic surgery. Resection and end to end anastomosis remains the main surgical procedure for tracheal obstructions since up to now tracheal replacement is unsolved and still remains a challenge for the future: all attempts performed with unreactive materials and allografts have led to persistent unpredictable but generally bad long term results.

The considerable advance in tracheal surgery in the last 30 years, is the result of the 3 following attainments:

1st: A best control in anesthetic and ventilatory techniques which have considerably increased in security:

1. Direct intubation across the operative field using flexible armored tube provides to the patient a continuous ventilatory control and oxygenation.
2. Recently the jet ventilation introduces more comfort in some procedures for instance in performing carinal resections.

2nd: A better knowledge of local conditions insuring a good tracheal healing after end to end anastomosis, these avoiding leakages, residual scarring and restenoses.

These main unquestionable principles can be summarized as follows:

1. Surgical resection anastomosis should never be performed in emergency condition. Acute obstruction must be managed by endoscopic procedure to prepare a planned surgical intervention. It is almost always possible to control the airway permeability through rigid bronchoscopy completed with laser desobstruction. This provides time for a complete subjacent bronchial cleaning, clearing of pneumonia and performing a meticulous anatomic assessment of the upper airway lesions and the basic functional respiratory status.
2. Complete resection of the pathologic area must be the aim of the procedure, allowing anastomosis on healthy tracheal or laryngotracheal walls. In that way, the preoperative preparation makes easier to demarcate the healthy area from the pathologic one in non-tumoral stenosis. Frozen section evaluation of the tracheal margins points out the limits of resection in tumoral stenosis.
3. A mucomucosal approximation and tension free anastomosis of 2 well vascularized tracheal stumps must be secured.
4. Patients must be extubated in the operating room and airway clearing should be maintained by chest physiotherapy or flexible bronchoscopy when necessary. Mechanical ventilation following tracheal surgery increases the risk of anastomotic complications and the possibility of dehiscence.

3rd: The third event bringing a positive contribution to the important progress in tracheal surgery is the considerable increasing of surgical indications since a number of patients appeared with stenosis of the airway after tracheotomy, intubation and ventilation for acute respiratory failure.

Clinical presentation

The main indication for surgery is tracheal obstruction. Dyspnea on exertion followed by paroxysmic attacks of dyspnea are the primary symptoms in all patients with clinically significant obstruction. Too often, such patients are misdiagnosed as victims of asthma, since the lung fields are radiologically clear. Symptom severity does not always correlate with the degree of stenosis and surprising stenoses may be temporarily tolerated.

Post intubation stenosis are generally diagnosed earlier than in other causes since intensive care physicians are well aware of this complication after resuscitation. Symptoms usually appear within 1 to 6 weeks after extubation. Stridor is present only

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when the diameter of the airway is reduced to 4 or 5 mm. Change in vocal function occurs with lesions involving the glottis or in case of recurrent nerve injury by a tracheal tumor.

Emergency management

Rigid bronchoscopy under general anesthesia is the best emergency treatment of tracheal obstructions. It secures ventilation and oxygenation of the patient, dilation of the stenosis, and distal toilet of the airway. Laser coagulation of granuloma, tumor or endoluminal scar immediately reestablishes adequate tracheal caliber, allows comfortable breathing and gives time for preoperative assessment and convenient preparation for curative operation. If rigid endoscopy is not available, forceful orotracheal intubation using a small-caliber tube should be performed. A few hours later, the small tube can be replaced by a larger one in the molded bed of the stenosis and then the stabilized patient may be transferred to a specialized center for further treatment. 2 pitfalls must be avoided at this moment (2): first, the creation of a tracheostomy below the stenosis which lengthens tracheal damages and will make more difficult the reconstruction; and second an emergency surgical resection anastomosis in an infected, inflamed, and unprepared field which increases the risk of leakage and restenosis.

Anatomical and functional considerations

The glottis permeability must be carefully assessed to verify an adequate glottic passage prior to tracheal reconstruction. This requires acceptable mobility of the vocal cords and the cricoarytenoid joints. The cervical trachea and the upper thoracic segment are plainly exposed through cervicotomy possibly enlarged in median sternotomy. Access to the distal trachea and carina is easier laterally through a right thoracotomy than through a median sternotomy which necessitates the great vessels retraction out of the way before any exposure of the trachea. Care has to be principally taken for 3 organs in tracheal surgery: the recurrent laryngeal nerves, the esophagus, and the innominate artery. The recurrent nerves run in the tracheoesophageal grooves. They could be injured if dissection is performed at a distance of the tracheal wall. At the level of laryngotracheal junction they pass deep to the inferior constrictor muscle behind the cricothyroid joint and the course and the division of the nerves arise behind the outer perichondral layer of the cricoid plate. Therefore a safe cricoid resection protecting the nerves against any injury must be performed subperichondrially with a curette. Arytenoid and vocal cord collapse are inescapably produced after total resection of the cricoid plate. Esophageal involvement has to be sought as well during assessment as during resection of tracheal lesions, and in that way small healed tracheoesophageal fistula may be found during resection of postintubation tracheal stenosis. Prevention of postoperative hemorrhage from the innominate artery necessitates a dissection very close to the trachea and adjacent tissue must be left posteriorly to the artery. Arterial blood supply of the trachea is provided by segmental small vessels which enter the trachea at its posterolateral margin. They send branches caudally and rostrally to form a longitudinal submucosal network. So, dissection of the anterior and posterior wall of the trachea for mobilization is possible without causing tracheal ischemia. On the contrary, if the dissection of the lateral part of the trachea is too extensively performed, the arterial supply will be interrupted and the mucosa will become ischemic. Furthermore, the preservation of a good mucosal vascularization at the anastomotic level prohibits to retain a tracheal tube with an inflated cuff compressing the submucosal vascular network below the anastomosis in the immediate post operative course.

Assessment of upper airway obstruction

The site and extent of the lesion must be meticulously defined to plan the level, the extent of resection and a laryngeal procedure if appropriate.

Plain chest X-ray will provide information about the status of the subjacent lungs. CT is particularly useful for evaluation of lesions involving the larynx and the subglottis showing chondritis or calcification of the cricoid. Moreover, multiplanar reconstruction of high quality provided by the helical (spiral) CT scan permits detailed evaluation of tracheal stenosis and tumors in cross-sectional and longitudinal dimensions. MR imaging may be complementary to the CT scan to assess the surrounding structures of the upper airways particularly with the coronal, oblique, and sagittal acquisition sections allowed.

Bronchoscopy is the mainstay of evaluation. Flexible endoscopy is carried out under topical anesthesia with the patient breathing spontaneously and able to vocalize. This permits assessment of the vocal cord function and the more distal airway dynamics during inspiration, expiration, forced expiration and coughing. Rigid bronchoscopy conducted under general anesthesia permits all measurements of the lesion, its position relative to the larynx and the carina, or the larynx involvement as well as therapeutics maneuvers as laser coagulation and dilatation when necessary. Esophagoscopy is routinely performed especially to assess esophageal involvement in tracheal tumors.

The basal functional respiratory status of the patient should be sufficient to allow weaning from ventilatory support and postoperative extubation.

Technique of tracheal resection anastomosis

Approach

Collar incision allows resection of cervical and upper thoracic tracheal lesions. An additional sternotomy may be added to resect tracheal lesion located on the mediastinal segment until 1 or 2 cm above the carina. Right thoracotomy could be a second possible approach for lesions located on the lower thoracic trachea or involving the carina.

Ventilation is provided routinely by an orotracheal tube passed through the stenosis or sometimes by the tracheostomy tube when the upper airway is totally closed. The area to be resected is often deformed, may be enveloped by fibrous tissue, and densely adherent to adjacent structures. The thyroid isthmus is divided. The trachea is then freed carefully by dissection close to its walls, first in the healthy tissues below the stenosis, avoiding damages to the esophagus and laryngeal nerves often included into the fibrotic scar tissues at the pathologic level. The trachea is taped, then mobilized using a blunt but careful finger dissection in germ-free environment before opening the trachea in order to facilitate a tension free approximation after resection.

Ventilation through the operative field and resection of the trachea

A long armored flexible endotracheal tube is positioned in the operative field, on the left side of the neck and connected to the ventilator under the sheets. The airway is divided transversely at the level of the healthy trachea immediately below the segment to be resected. The oral endotracheal tube is pulled back into the proximal airway (Fig. 1) and the end of the distal trachea is then intubated with the armored tube. The tracheal resection is then performed from down to upward; the opening of the trachea on the midline allows an accurate mucosal inspection as high as the upper limit of stenosis. Traction on the pathologic segment allows a progressive and safe dissection along and very close to the tracheal wall, drawing back recurrent nerves and esophagus. Finally, the trachea is divided transversely between 2 rings immediately above the lesion. 2 strong stay sutures are placed on the proximal and distal stumps and will serve for traction and approximation of the tracheal ends at the time of anastomosis.

Cricoid resection

The lesion of the airway often runs over the laryngotracheal junction and consequently requires partial or total cricoid resection to be completely removed (Fig. 2). In these cases, the cricoid perichondrium is incised round the inferior edge of the cricoid ring. A slice of cartilage is cut out subperichondrially us-

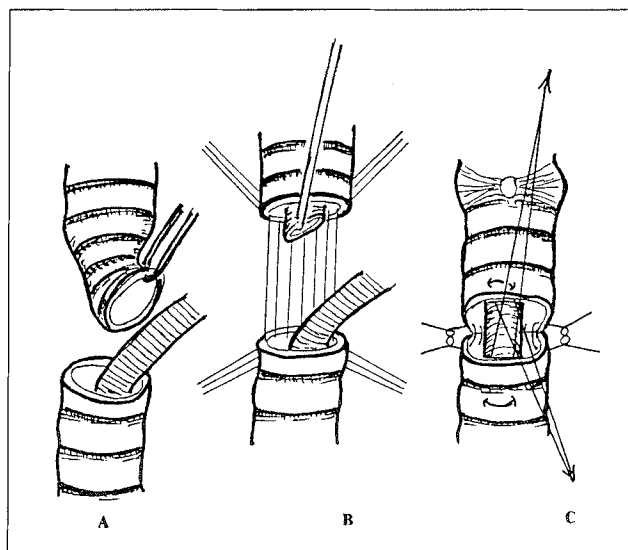


Fig. 1. 3 stages in tracheal resection with end-to-end anastomosis. (a) Ventilation is transferred directly to an armored distal tracheal tube across the operative field. Tracheal resection is performed close to the tracheal wall, down to upward. (b) The anastomosis is constructed with posterior suture first. The oral endotracheal tube, the tip of which retained with a thread, is pulled back into the proximal airway. (c) The distal tracheal tube is withdrawn, and ventilation goes back through the orotracheal tube which is pushed down into the distal trachea. Once the posterior and lateral sutures are tied the anastomosis is then completed on the anterior tracheal wall. All knots are outside the lumen.

ing fine curette. This technique does not need identification of the recurrent nerves while preserving their branches of division. More or less of the cricoid plate can be excised until the resection reaches the margin of healthy mucosa. The best is to preserve, when possible, a rim of superior cricoid cartilage which will serve to support the arythenoids and thus the glottic opening. Nevertheless, previous chondritis or cartilage necrosis may result in the entire rigid structure being removed during the curettage. When this happens, the perichondrium being preserved and cleaned carefully, a periosteal or a perichondral graft may be inserted in the bed of the cricoid plate, and the laryngotracheal anastomosis with mucomucosal apposition carried out as above mentioned. The graft is slightly fixed with 3 to 4 thin knots be-

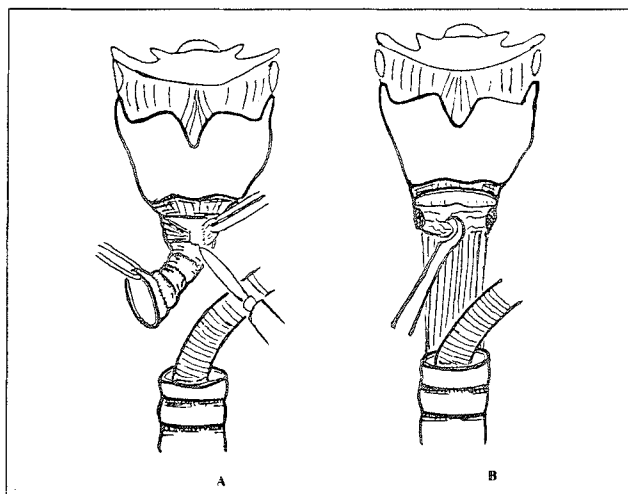


Fig. 2. Subperichondral cricoid resection for laryngotracheal stenosis. (a) Total or partial denudment of the cartilage. (b) Resection of the denuded cartilage up to the level of healthy laryngeal mucosa.

fore being covered by the posterior wall of the distal trachea. If any difficulty for a perfect mucomucosal apposition at the suture level, the graft may be covered with a posterior tracheal flap according to the Grillo fashion (5). After total cricoid resection the laryngeal collapse will be controlled by insertion of a Montgomery T tube arising just above the level of the vocal cords for 3 to 6 months until achievement of a competent rigidity of the laryngeal posterior wall.

Anastomosis

The anastomosis is performed in interrupted sutures with knots tied outside the lumen using a resorbable monofilament suture material 3-0 and 2-0 (PDS, Ethicon, Neuilly sur Seine, France) (Fig. 1). The thyroid isthmus and strap muscles are approximated in the midline to buttress the tracheal space and anastomosis. Furthermore approximation of pretracheal tissues and thymus vestiges between the tracheal suture line and the innominate artery is strongly recommended. Flexion of the neck is also recommended in every extensive resection and is usually maintained post operatively using 2 strong sutures fixed from the chin to the presternal skin.

Tracheal release maneuvers

Treatment of very extensive tracheal stenoses is one of the challenges of tracheal resection. Various lengthening options are available to allow tracheal approximation and suturing with low tension. These procedures include dissection of the pretracheal plan, cervical flexion, laryngeal release, and hilar release techniques. The 2 former procedures have been described above and are performed routinely for all tracheal resections. Laryngeal release, according to the Dedo and Fishman technique (4) or still better to the Montgomery release (8), lengthens the possibility of resection from 2 to 3 cm but is known to cause significant aspiration problems. Hilar release may be performed too, through a median sternotomy or a right thoracotomy approach. It includes a series of individual techniques, all designed to release the lung hilum and the distal trachea in an in bloc fashion (7).

Postoperative management

Patients must be extubated promptly in the operating room and airway clearing will be easily maintained by chest physiotherapy and suction through flexible bronchoscopy when necessary. Postoperative treatment includes adapted antibiotics and steroids (for 5 to 7 days) through general and inhaled route, the latter mainly when the procedure is extended up to the larynx since they prevent submucosal edema and dyspnea. Oral feeding is reintroduced between the 3rd and 7th day according to the level of cooperation of the patient and after deglutition testing to verify absence of aspiration. A flexible endoscopic control of healing is performed on the 15th postoperative day and if satisfactory the sutures maintaining the cervical flexion are removed. When in very exceptional cases an immediate post operative edema of the larynx requires reintubation, that should be done without extension of the neck and guided by a flexible fibroscope inside the lumen of the tube. We recommend an uncuffed endotracheal tube avoiding mucosal compression for a few days. Temporary stenting (over Montgomery T tube for 3 to 6 months) is justified only after associated laryngeal enlargement or to prevent laryngeal collapse after total resection of the cricoid cartilage.

Indications

Tumoral obstructions and post intubation stenoses are the 2 main indications for tracheal resection and anastomosis. Other indications are idiopathic (5) and post traumatic stenoses (3).

Tracheal tumors

Primary tumors of the trachea are of 3 main types: malignant (squamous or glandular cell), intermediate malignant (adenoid cystic carcinoma or carcinoid) and benign. Other neoplasms (larynx, thyroid, esophagus, lung) may involve the trachea by

extension have to be considered separately. The most frequent tracheal tumors are squamous cell carcinoma and adenoid cystic carcinoma. Although tracheal involvement by malignant tumors is common, tracheal resection for tumors is relatively infrequent since restrictions for surgical resection frequently result of mediastinal widespread of the tumor at the time of diagnosis. Furthermore palliative exeresis has loosen a large number of indications since other non invasive techniques (electron therapy, laser or cryotherapy, transtumoral prosthesis) can provide a symptomatic relief to the patients. Even in benign tumors, surgical indications are decreasing although always curative since laser photocoagulation is liable to remove efficiently all pediculated tumors. That explains the paucity of experience in a large number of surgical series. As result of these considerations, the current indications of resection anastomosis are at the time:

- malignant tumors when short in size and localized, being possibly accessible to complete exeresis.
- benign tumors when they have a large pedicle or an iceberg development.

Worthwhile survival can be obtain in patients with carcinoma when a complete and possibly curative resection is achieved. The length of the exeresis must be advised after perioperative frozen section evaluation of the tracheal margins but it is well known that islets of tumoral cells can spread in the submucosa up to the microscopically visible limits of the tumor, mainly in adenoid cystic carcinoma. Consequently the rate of local recurrence is high and the resection is frequently considered as incomplete. That is why both types of tumors squamous and adenoid cystic carcinoma being sensitive to irradiation, the common policy in this time is to add an adjuvant radiotherapy after tracheal resection for all types of malignant tracheal neoplasm according to Grillo and Pearson recommendations (6). Although the level of local recurrence is high and distant metastases frequent, a satisfactory result with a 10 years survival was obtain in 13 % of squamous carcinoma cases and in 56 % of adenoid cystic carcinoma after tracheal resection anastomosis in large series (6). Consequently tracheal resection should be recommended in all types of tracheal tumors as often it appears to be possibly radical and within the limits of a predictable primary end to end anastomosis reconstruction.

Fibrous stenoses

The most are post intubation stenoses secondary to resuscitation but some of them are idiopathic. Origin of idiopathic stenoses are absolutely unknown (5). A few characteristic histologic aspects or a clinical context gave recently the possibility of binding some of these stenoses to specific diseases as Wegener's granulomatosis, amyloid, polychondritis. The principles of treatment of fibrous stenoses depend largely on the location of the lesion and on the presence or absence of laryngeal damage, that is why 2 types of stenotic lesions are thus defined: Isolated tracheal stenosis and laryngotracheal stenosis. Therapeutic indications became well classified in the 10 last years: resection followed by end-to-end anastomosis for tracheal stenosis, and resection with or without laryngoplasty for laryngeal stenosis.

Tracheal stenoses

Surgical treatment is now well codified and excellent results are reported in several series. However, important difficulties may arise from the general status of the patient and from the local aspect of the lesions and should be discussed (2):

1. Old age, per se, constitutes certainly a risk factor for morbidity and mortality but is not a contraindication to tracheal resection.
2. Dealing with multifocal or very long stenoses indicates the various techniques of tracheal release, nevertheless may lead to impossibility of resection anastomosis.
3. After brain trauma or cerebral vascular accident, neurologic inability requires that the patient at least be able to swallow

without aspiration, cough and expectorate on command before surgical resection.

4. The most difficult decision is to decide whether to resect or permanently tracheostomize chronically respiratory failing patients. It is difficult to predict which patients will be at risk for early relapse of acute respiratory failure. These patients are sometimes best managed with endoluminal stents or permanent tracheostomy.

Laryngeal stenoses

When tracheal resection and end-to-end anastomosis is now a well established technique under well-codified indications, laryngeal restoration is a much more difficult. When the trachea may almost be considered as a pipe, the larynx is a real sensitive and moving organ much more complex to rehabilitate. Perfect assessment of the laryngeal function and permeability is mandatory before planing the surgical treatment. The result can be summarized as follow (1):

1. Tracheal and laryngeal subglottic stenosis with open and mobile glottis is best managed by resection of the involved trachea and the cricoid ring as formerly described after *Gervat* and *Bryce* and *Pearson* (9). More or less of the cricoid plate may be excised until the resection reaches the margins of healthy mucosa. A posterior tracheal mucosal flap may be fashioned as described by *Grillo* (5) to cover the cricoid plate up to the basis of the vocal cords if bared after resection of fibrous and inflammatory tissues.
2. Tracheal and subglottic stenosis associated with total destruction of the cricoid posterior plate by chondritis and necrosis justifies extended resection and total ablation of the cartilage with conservation of the vocal cords followed by laryngotracheal anastomosis provided that the laryngeal patency and the vocal cord opening will be maintained with a Montgomery T tube for 3 to 6 months until the cricoid posterior wall becomes rigid enough to be capable of supporting the arytenoids and abduction of the vocal cords.
3. Total laryngeal glottic and subglottic obstruction with destruction of the cricoid skeleton cannot be managed other than by extended laryngeal resection followed by supraglottic laryngotracheal anastomosis or by definitive tracheostomy.
4. Short subglottic stenosis that do not involve more than one or two tracheal rings but associated with glottic opening difficulties are not subject to resection but to laryngeal enlargement and molding. For these patients, who often have palsy or rigidity of 1 or 2 vocals cords with a well-preserved laryngeal squeleton, laryngeal and glottis enlargement derived from the *Rhetti's* fashion (11) have to be performed through a vertical posterior and anterior cricoidotomy. The separation of the edges is widened to 3 to 5 mm and a thin slice of periosteal free graft is inserted between them in the bed of the posterior cricoidotomy. The vocal cords abduction and the adequacy of the glottic passage are checked and, if they are inadequate, similar insertion between the margins of the anterior section can achieve a complementary enlargement. The section of a fibrous scar between the anterior part of the vocal cords enlarging the glottis slot may be necessary too. The posterior graft is fixed with some thin knots to the edges of the cricoidotomy until the T tube stent positioning maintains it in place with an appropriate caliber. The anterior graft, when necessary, is similarly sewn to the anterior slot over the tube. The width of the larynx is maintained over the T tube for 3 months until the rigidity of the posterior graft supports the posterior diastasis of the cricoidotomy. Large fibrotic scars must be resected as completely as possible and the wound must be covered with mucosa as fully as possible, especially in children, in whom conservation of an important block of fibrosis may be the cause of impaired laryngeal growth.

Clinical results

Our clinical experience includes 251 patients which underwent surgical procedures for upper airway nontumoral stenosis. There were almost equal numbers of male and female and the average

age was 41 years (range 3 to 88 years). 135 patients (54 %) suffered from tracheal stenosis and the others (46 %) from laryngeal or laryngotracheal stenosis.

- In 135 patients which underwent tracheal resection and end to end anastomosis for tracheal stenoses, the result was excellent to good in 131 (97 %). 3 patients died and there was 1 failure requiring postoperative stenting.
- The results for the laryngotracheal stenoses are slightly lowered as result of the complexity of the lesions and sometimes of increased damages after failure of previous surgical or endoscopic procedures.
- 72 patients underwent subglottic resection and anastomosis after resection of the cricoid ring and more or less of the lower edge of the cricoid plate. There were 69 successes (96 %), 2 failures, and 1 death after anastomotic leakage followed by innominate artery ulceration on day 10.
- 7 patients underwent a T tube stent for postoperative glottic instability and collapse after total cricoid resection and subglottic laryngotracheal anastomosis. Respiratory result was good in 6 patients, phonetic result good in one and only fair in 5. 1 death occurred after anastomotic leakage.
- 3 patients underwent extended laryngeal resection with supra-glottic laryngotracheal anastomosis. 1 patient had temporary swallowing difficulties with aspiration controlled by rehabilitation. The respiratory result was excellent. The phonetic result was poor nevertheless acceptable allowing normal everyday communication.
- 13 patients underwent laryngeal enlargement of the glotto-subglottic segment over a T tube. The result was good in 12 cases, but 1 patient died of an unrelated cause.
- 7 patients who suffered from post traumatic laryngotracheal disruption and stenosis with vocal cords palsy underwent resection of the stenotic segment, horizontal partial cricoid ring resection, glottic enlargement through vertical cricoid plate division and laryngotracheal anastomosis over a T tube stent. All the 7 patients had good respiratory and good phonatory results (3).
- 14 patients with complex and unclassifiable lesions underwent unclassifiable procedures combining various degrees of resection, cordectomy, or cordopexy frequently followed by modeling over stents. There were success in 11 cases (78%), 3 failures and 1 death after anastomotic leakage. 4 patients had temporary swallowing difficulties.

During the same period, a very small number of tracheal tumors were fit to be resected with absent or resectable mediastinal spread. They have been reported in the multicentric retrospective study of the French Thoracic Surgery Society (10). Our contribution was 11 squamous cell carcinoma, 7 cystic adenoid carcinoma and 2 benign tumors. The results of a so short series are acceptable but not significative. The results of the entire series where more significant: The actuarial survival at 3 and 5 years was respectively, 73 % and 57 % for adenoid cystic carcinomas, and 47 % and 36 % for tracheal cancers.

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Kongressankündigung / Congress Announcement

11. Berner Chirurgen-Symposium

Termin und Ort: Freitag, 19. November 1999, 8.30–18.30 Uhr
Hörsaal 1 der Kinderklinik, Inselspital, Bern, Schweiz.

Thema: Moderne Pankreaschirurgie: Akute Pankreatitis, chronische Pankreatitis, Tumoren.

Auskünfte und Anmeldung: Frau B. Oetliker, Klinik für Viszerale und Transplantationschirurgie,
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