**Paparella: Volume III: Head and Neck**

**Section 2: Disorders of the Head and Neck**

**Part 4: The Pharynx**

# Chapter 25: Tumors of the Hypopharynx

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Although it was originally called the laryngopharynx because of its intimate relationship to the closely related larynx, the hypopharynx is now accepted as extending from the tip of the epiglottis to the lower border of the cricoid cartilage. In practice, a horizontal line drawn at the level of the body of the hyoid bone serves as the division between posterior oropharynx and hypopharynx walls, whereas inferiorly the cervical esophagus extends from the lower edge of the cricoid cartilage to the thoracic inlet.

Benign tumors arising within this region are exceptionally uncommon, and even squamous carcinomas have an incidence rate of less than 1/100.000 of all newly diagnosed cancers. As with many other malignancies arising within the head and neck, tobacco and alcohol play an important role in carcinogenesis, although they offer little explanation for variations in incidence figures between individual sites within the hypopharynx. Long-term cure remains the primary aim in treating malignant hypopharyngeal tumors; however, restoration of effective laryngopharyngeal function has attracted increasing attention within the last decade, since preservation of life alone is no longer accepted as effective management. Despite developments in technical expertise, long-term prognosis remains poor, largely because of a combination of late diagnosis and an aggressive natural history. Advances in our understanding of the surgical pathologic characteristics of these tumors has resulted in better therapeutic adeptness, although some controversy persists. As with many other head and neck tumors, centralization of expertise is probably the best means of enhancing both cure rates and effective rehabilitation.

## Anatomy

Traditionally, and for the purposes of classification and epidemiologic studies, the hypopharynx is divided into the postcricoid area, pyriform sinus (or fossa), and the posterior pharyngeal wall. Although convenient for description, few malignant tumors are diagnosed while restricted to a single region, and no histologic criterion distinguishes one epithelial surface from another. However, each side does possess individual anatomic features that, in part, explain difficulties in both diagnosis and tumor management.

The lumen of the hypopharynx is cone-shaped, with the wider opening superiorly; it becomes narrower in the postcricoid area, passing into the cervical esophagus, which oncologically can be considered as a narrowed lower extension of the hypopharynx. The anterior wall opens directly into the larynx, whereas the posterior aspects of the arytenoid cartilages form

the upper boundary of the postcricoid area. In essence, the hypopharynx is a mucosa-lined tube related to muscle laterally and posteriorly and with the laryngeal cartilages anteriorly.

The epithelium is of the stratified squamous type, with a high content of glycogen giving the cells a clear appearance. Lymphocytes are often numerous within the pyriform fossa, and the whole submucosa contains both mucous and serous glands. The rich plexus of lymphatic vessels accounts for the frequency with which hypopharyngeal tumors spread to regional lymph nodes. Outside this mucosal lining lies the fibrous layer of pharyngeal aponeurosis, a muscular layer formed by the inferior constrictor and the distal portion of the middle constrictor muscles, whereas the outer layer is part of the buccopharyngeal fascia. Loose connective tissue separates the pharynx posteriorly from the prevertebral fascia - that part of the deep cervical fascia covering longus capitis and coli muscles and the last three cervical vertebra. Lateral to the larynx are the pyriform sinuses, each bounded laterally by the thyrohyoid membrane and thyroid ala. In its lateral wall, the mucosal fold covering the internal branch of the superior laryngeal nerve is variable in position. Its connection with the auricular branch of the vagus nerve (Arnold's nerve) at the jugular ganglion accounts for the referred otalgia commonly found with pyriform sinus tumors. Medically, the sinuses are related to the arytenoid cartilages, aryepiglottic fold, and apex of the laryngeal ventricle.

The posterior portion of the pharyngeal wall is a relatively narrow area extending from the floor of the vallecula to the level of the cricoarytenoid joint. Its intimate relationship to the nasopharynx above, to the tonsils laterally, and to the postcricoid area inferiorly make diagnosis of early lesions unlikely.

The postcricoid area extends from the posterior surface of the arytenoid cartilages and their connecting folds to the inferior border of the cricoid cartilage. Consequently, the lateral margin is the anterior part of the pyriform sinuses, and although occasionally called the pharyngeoesophageal area, the size of the postcricoid region is related primarily to the area of the posterior plate of the cricoid cartilage. On cross section, the postcricoid area is oval, but in the resting state it is closed by the contracted cricopharyngeus muscle.

Motor and sensory nerve supply to the hypopharynx comes from the pharyngeal plexus formed by branches of the glossopharyngeal and vagus nerves, together with the superior laryngeal branch of the vagus.

The rich lymphatic network draining the pharynx and cervical esophagus plays an important role in the frequency with which regional metastasis occurs in hypopharyngeal malignancy. Primary drainage passes to the upper deep cervical nodes, although it is suggested that lymphatics from the posterior portion of the pharyngeal wall go to the retropharyngeal nodes of Rouviere. Tumors arising within the inferior part of the hypopharynx metastasize to the lower deep cervical nodes, as well as to the less accessible paratracheal nodes.

## Etiology

Benign tumors, such as lymphoma, rhabdomyoma, and chondroma, are so rare within the hypopharynx that no common causative factor is apparent. However, variations in incidence of pyriform sinus and postcricoid cancer throughout the world, together with reported differences in sex ratios, have attracted investigation into possible etiologic factors that might be responsible for these highly malignant tumors.

Tobacco is considered the single most frequent cause of head and neck cancer, although the risk at individual sites appears to be related to the way in which it is used. Although cigarettes are associated with an increased risk of cancer at all sites, except the salivary glands, cigar smokers experience an increased risk in the tongue and pharynx, as do pipe smokers.

Recent studies from Scandinavia and North Carolina also suggest an excess risk of cancer within the pharynx associated with snuff use. Risk increases with the quantity and duration of tobacco usage. However, alcohol as well as tobacco have long been recognized as increasing the risk of pharyngeal as well as oral and laryngeal cancers. Brugere and associates investigated 2540 patients with laryngopharyngeal and oral cancer - 366 had cancer arising within the hypopharynx, and the relative risks with alcohol consumption adjusted for tobacco usage showed a fivefold increase over the measurements obtained when tobacco consumption was adjusted for alcohol. Despite the inherent difficulties of such an evaluation, the combination of alcohol and tobacco does appear to be the only recognized factor in the production of some hypopharyngeal cancers. Such an analysis applies to pyriform sinus cancer, which, except in parts of northern Europe, is the most common site of occurrence within the hypopharynx.

Postcricoid carcinoma appears to be a different disease and is uncommon in countries with a high incidence of pyriform sinus malignancy. Although a female preponderance has always been recognized, this factor appears to be changing. Reports on the female to male ratio vary from 24:1 to about 3:1, the highest figures originating from the older publications.

Twenty-five years ago, the relationship of this tumor to sideropenic dysphagia, the Paterson-Brown-Kelly (or Plummer-Vinson) syndrome, was accepted. Classically, the patient was a middle-aged woman with a long history of a "small swallow", hypochromic anemia, koilonychia, and a pharyngeal web. Writers such as McNab-Jones and Jacobs and Kilpatrick found a varying incidence of patients with this syndrome in whom postcricoid carcinoma eventually developed.

More definite evidence was reported from Sweden in 1957, but Larsson and co-workers, in 1975, found a dramatic reduction not only in the Paterson-Brown-Kelly syndrome but also in postcricoid carcinoma. Both reductions were thought to be secondary to improvements in diet. An occasional patient may still be seen with a history of iron deficiency anemia associated with a lower hypopharyngeal web that requires dilatation. It is doubtful, however, if postcricoid carcinoma were developed in more than a small number of such patients.

Changes in the sex ratio may be related to an increase in tobacco and alcohol use in women, leading perhaps to a variation in site and sex ration for hypopharyngeal cancer.

## Surgical Pathologic Features

Although three separate sites are recognized as composing the hypopharynx, the mucosal linings are in continuity, as are the individual anatomic sites. The difficulties of evaluating a three-dimensional diseaseby clinical and radiologic means are well known. However, pathologic examination of operative specimens provides valuable information as to patters of spread and reasons for local and regional failure. Michaels studied 85 operative specimens of hypopharyngeal carcinoma, finding that in 60 per cent, the tumor involved more than one site. This was similar to my experience examining operative specimens by whole-organ serial sections, although the distribution of site of origin was different. Such varying experiences for postcricoid carcinoma are much less common than for pyrifosm sinus tumors.

Squamous carcinoma arises from an unstable field of surface epithelium within the hypopharynx and may vary from being well to poorly differentiated. Undifferentiated carcinoma is particularly frequent within the pyriform sinus, although varying degrees of differentiation may be found within individual tumors. Submucosal spread is common, with tumor that is present beneath intact mucosa giving a false impression of clear margins of excision. Examination of pharyngolaryngectomy specimens by whole-organ serial section showed an average of 10 mm submucosalspread superiorly and 5 mm inferiorly within the cervical esophagus. "Skip" areas may occur, and carcinoma in situ often surrounds the primary tumor. Such extensions limit the feasibility of adequate excision with large tumors and should influence treatment planning.

The muscular walls of the hypopharynx provide little resistance to neoplastic growth, and such invasion is usually impossible to detect clinically. Although both thyroid and cricoid cartilages are resistant to invasion, pyriform sinus neoplasms spread rapidly along mucosal surfaces to the posterior pharyngeal wall and postcricoid region. Medial spread involves the aryepiglottic fold, the intrinsic laryngeal musculature, and the cricoarytenoid joint. Spread from the apex may reach the readily accessible lateral aspect of the ventricle and thus the paraglottic space. Vocal cord fixation is indicative of laryngeal involvement.

Posterior pharyngeal wall tumors, unless very small, rapidly grow up into the nasopharynx - laterally to involve the tonsillar region and soft palate or inferiorly toward the postcricoid region. As with primary postcricoid tumors, penetration of the muscular wall is frequent leading to invasion of prevertebral fascia or the lateral part of the neck. Extension anteriorly may involve the posterior cricoarytenoid muscle, but rarely the underlying cricoid cartilage. Growth inferiorly into the cervical esophagus is common and may then involve the esophagotracheal wall. The thyroid gland is frequently involved by both pyriform fossa and postcricoid tumors, either by direct extension or secondary to lymph node metastasis.

The rich lymphatic supply of the pyriform sinus leads to a high incidence of metastasis, usually to the readily accessible upper deep cervical lymph nodes. The retropharyngeal nodes are

close to the skull base and are inaccessible. The same is true of most of the paratracheal nodes, which lie close to the lower poles of the thyroid gland or within the superior mediastinum. Histologic evidence of involvement of these lymph nodes may be evident on examination of the operative specimen, although they are undetected clinically. As yet computed tomography CT scanning of these regions has proved unrewarding.

Understanding the pattern of spread of hypopharyngeal tumors as revealed by whole-organ serial sectioning has greatly assisted our planning of surgical management, providing an explanation for failure to obtain local control.

## Problems of Classification

Dividing patients into groups related to surviva has a practical value and is the basis of the TNM (tumor, node, metastasis) system of classification. Both the International Union Against Cancer (UICC) and American Joint Committee (AJC) have agreed on a system for classifying tumors of the hypopharynx, which unfortunately is lacking in clinicopathologic value (Table 1). A valid classification should be based on tumor characteristics that are relevant to both treatment and prognosis as well as being easy to assess. Within the hypopharynx, precise clinical staging is difficult for tumor extension, and fixation to surrounding structures may be impossible to detect.

**Table 1. Staging of Lesions in the Hypopharynx**

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| $T_{is}$ | Preinvasive carcinoma (carcinoma in situ) |
| $T_0$ | No evidence of primary tumor |
| $T_1$ | Tumor confined to one site |
| $T_2$ | Tumor with extension to adjacent site or region without fixation of hemilarynx |
| $T_3$ | Tumor with extension to adjacent site or region with fixation of hemilarynx |
| $T_4$ | Tumor with extension to bone, cartilage, or soft tissues |
| $T_x$ | The minimum requirements to assess the primary tumor cannot be met. |

Comparison between clinical and pathologic staging can show errors of 40 per cent, making statistics based upon current classification systems unreliable. The problem associated with vocal cord fixation in $T_3$ pyriform sinus cancer have been analyzed by Tani and Amatsu, using histologic assessment of operative specimens. Tumor extending medially produced vocal cord fixation, usually by invasion of intrinsic musculature, rather than involvement of the cricoarytenoid joint or arytenoid. However, lateral extension tended to go beyond the thyroid lamina ($T_4$ disease) but with a mobile cord. Pyriform sinus tumors can progress from $T_1$ to $T_4$ disease without ever going through a $T_3$ classification when arising on the lateral portion of the wall - those originating on the medial portion of the wall may cause cord fixation ($T_3$) without ever having been classified as $T_2$.

Willatt and co-workers have shown that both vocal cord paralysis and tumor length are important prognostic factors in postcricoid cancer. Tumor lenght is related to the degree of spread

through the muscle wall, and vocal cord paralysis may indicate invasion of the arytenoids or, more importantly, involvement of the recurrent laryngeal nerves outside the esophagus. Extension into the esophagus is ignored in present staging systems, although extension to the larynx, relatively unimportant since this organi is easily removed, warrants a $T_3$ grading.

Although cervical lymph node involvement is known to signify a poor prognosis for all head and neck cancers, the statistical analaysis showed no relationship between N stage and survival for postcricoid cancer. This is probably because of the fact that the N stage correlates with tumor length and vocal cord paralysis, thus confounding statistical analysis. Furthermore, prognosis for cervical lymph node metastasis with hypopharyngeal cancer is more accurately correlated with the node level within the neck becoming lass as the level moves toward the thoracic inlet. Without modifications, existing classification systems are of only minimal vallue for accurately reflecting prognosis or tumor extent.

## Diagnosis

The most common site for tumor involvement within the hypopharynx is the pyriform sinus. However, the period during which the patient is asymptomatic allows the lesion to become large prior to detection. Mild dysphagia or the sensation of "something in the throat" is a common symptom of many benign conditions, and diagnosis often awaits the onset of severe dysphagia, weight loss, referred otalgia, hoarseness, or a mass in the neck.

Similar imprecise sensations localized to the area around the larynx and progressive difficulties in swallowing are common in postcricoid carcinoma and may eventually be accompanied by excessive blood-stained salivation.

Indirect mirror examination reveals most posterior pharyngeal wall tumors and the upper extent of larger neoplasms in the postcricoid or pyriformsinus. However, pooling of saliva, which frequently accompanies difficulty in swallowing, should always arouse suspicion of malignant obstruction.

Lack of crepitus when moving the larynx over the cervical spine occurs only with large postcricoid lesions, whereas any alteration in vocal cord mobility is indicative of extensive disease. A high index of suspicion is essential if these tumors are to be diagnosed at an early stage, but many patients present with more than 6 months of significant history.

Prior to direct laryngoscopy and endoscopy, which are essential to confirm malignancy and determine, when possible, the macroscopic extent of the tumor, radiologic examination is desirable.

Soft tissue radiographs of the neck not only show increased thickness of the retropharyngeal or retroesophageal space in tumors of the pharyngeal wall or cervical esophagus but also give an indication of potential involvement of the posterior wall of the trachea.

Gastrograffin swallow is preferred to barium if any spillover into the trachea is suspected, and although it shows obstruction or filling defects, the lower extent of a cricoesophageal tumor is rarely confirmed.

Coronal polytomography may help in showing the extent of pyriform sinus lesions and may occasionally reveal cartilage destruction. CT scanning has largely replaced tomography, but in my experience it rarely provides increased information on pyriform sinus tumors, although it is helpful in the $N_0$ neck. Most hypopharyngeal tumors are diagnosed only when they are large, and reliance on apparently normal radiologic features when planning therapy ignores previous studies on surgical pathologic characteristics and patterns of spread.

Endoscopic examination, apart from confirming the presence of a tumor and obtaining biopsy material, may occasionally detect an unsuspected synchronous primary tumor. Since most tumors are large and bleed readily, determination ofthe macroscopic margins is often difficult. However, the upper extent is particularly important and must be seen to determine possible margins of surgical excision. The neck should be reexamined under anesthesia because relaxation of the sternomastoid muscle may allow previously undetected nodes to be palpable. Needle biopsy of suspicious lymph nodes may also be undertaken for the purpose of more accurate assessment. Chest x-ray films and a general examination for suspected metastasis is mandatory, as are the clinical procedures that are now standard prior to all major surgical operations.

Identical diagnostic protocols should be followed even when a benign tumor is suspected, since lesions such as chondromas and benign lymphomas may be re-evaluated as being slowly growing malignancies with a tendency to recur locally if inadequately treated.

## Principles of Management

The fundamental aims of all oncologic management is to remove tumor completely while preserving function and minimizing the possibility of local recurrent and regional or systemic metastasis. This is rarely possible within the hypopharynx, since the extensive nature of the neoplasm at diagnosis, together with the risk of field changes and "skip" lesions, may prevent radical excision. Metastases to the regional lymph nodes and the risk of systemic spread later jeopardize long-term cure, even in those patients with apparent local control. Surgical excision frequently necessitates removal of both larynx and pharynx, although improvement in reconstructive techniques during the last decade has ensured adequate swallowing in most patients.

Apart from confirming the poor long-term cure rate for hypopharyngeal cancer, a search of publications over the past 30 years does little to assist our understanding of these neoplasms. Surgical excision was frequently limited by the inability to reconstruct. When combined with radiotherapy, both timing and techniques were so varied as to prove almost impossible to analyze. Perhaps even more important was a failure to understand the natural history and pathways of spread. Whole-organ serial sectioning has provided valuable information on which modern management must be based while awaiting treatment modalities that are more effective than

surgery and radiotherapy.

Recurrence of cancer at the primary site is an important cause of both morbidity and mortality in head and neck cancer. This is particularly so with advanced tumors or when adequate margins of excision are unobtainable. Looser and colleagues found a failure rate of 39 per cent even when the margins were at least 5 mm in stages 3 and 4 disease, rising to 73 per cent with unsatisfactory margins. However, postoperative radiotherapy may reduce local recurrence rates, irrespective of whether the primary lesion was initially $T_1$ or $T_4$, by treating residual microscopic tumor.

Preoperative radiotherapy does not appear to enhance success in controlling local disease, possibly because of compromised immune response and the difficulties of ensuring adequate margins of excision.

Although inferior extension of postcricoid tumors into the esophagus is now resectable even when they enter the superior mediastinum, superior extension continues to pose problems of access. If surgical margins are doubtful, primary closure should be delayed until there is evidence of tumor control, that is, a temporary pharyngostome should be performed.

The wide variety of effective techniques for closing the surgically created pharyngoesophageal gap not only has markedly enhanced rehabilitation of trouble-free swallowing but also lessened the need for limited pharyngeal resection in small pyriform sinus and posterior pharyngeal wall tumors. For many years, preservation of a remnant of pharyngeal mucosa to allow primary closure was important to accentuate restoration of swallowing. Not only did this leave potentially dangerous tissue in situ but also frequently resulted in a constricted pharynx that allowed only a liquid diet. Partial pharyngolaryngectomy is less commonly performed today, although attempts at conserving some laryngeal function in both pyriform sinus and postcricoid carcinoma are attracting attention.

Primary radiotherapy, although theoretically preferable if accompanied by a high cure rate, is most suitable for the rarely diagnosed T1 tumor. Even then, the sequelae within the postcricoid area may result in continued dysphagia, whereas residual or recurrent disease in the pyriform sinus may be difficult to detect. More than 60 per cent of pyriform sinus tumors have palpable neck metastases at diagnosis, and it is in the high-risk patient with no clinical evidence of neck lesions that radiotherapy is now considered to play an important role.

Tumors arising in the postcricoid region or posterior pharyngeal wall present a considerable problem, since lymphatic drainage is invariably bilateral and some of the nodes at risk are inaccessible!

The availability of operations allowing wide resection to be accompanied by effective primary reconstruction has led to a more aggressive approach to hypopharyngeal neoplasia. However, these procedures are accompanied by significant morbidity and mortality, and patient (and surgeon) selection is essential. Long-standing dysphagia results in a negative nitrogen

balance, which, together with systemic conditions such as diabetes, cardiovascular disease, or emphysema, may invalidate otherwise effective operations. Published long-term results of these otherwise excellent operations suggest only a modest improvement in long-term cure rates, although they provide excellent short-term rehabilitation. Restoration of trouble-free swallowing is good palliation but is negated by failure to control local or regional disease. The increasing incidence of systemic metastases in patients whose local disease is apparently controlled is an added disappointment. There is, however, no evidence that systemic chemotherapy has any beneficial effect in either preventing or treating this problem, but it certainly increases both cost and morbidity.

The essence of good patient management can be paraphrased as follows: careful evaluation of the extent of primary tumor and the presence of regional lymph node metastases, assessment of the patient's general and psychologic state, followed by selection of the most appropriate and safe means of widely excising the primary lesion with regional lymphatics, if involved. Primary repair is desirable if margins are considered clear. Postoperative radiotherapy should be given for doubtful margins or $N_0$ necks.

There will be some patients, however, who fail to meet these criteria and who are untreatable in the narrowest sense - they will be considered later in this chapter. As Galen said 18 centuries ago: "The early cancer we have cured, but the one that rose to considerable size without surgery nobody has cured".

## Treatment of Pyriform Sinus Tumors

Because of the poor prognosis and late diagnosis, pyriform fossa cancer was previously treated with radiotherapy alone. During the last decade, improvements in radical surgery and reconstructive methods, together with better radiation techniques, has greatly altered the management of this neoplasm, without, unfortunately, radically improving long-term cure rates. The value of combined treatment with preoperative or postoperative irradiation has been dsicussed in a wide variety of publications with differing conclusions! Such discrepancies do not necessarily reflect the supremacy of specific treatment regimens as much as variations in surgical pathologic features. The intrinsic difficulties in establishing the true extent of the primary tumor, and thus the efficacy of surgical resection, have already been discussed. Without detailed pathologic study of the surgical specimen, accurate T staging is unsure and may be vital in estimating the incidence of local recurrence and the possible preventive value of postoperative radiotherapy. The effectiveness of surgery alone seems to decrease as the primary tumor increases in size - there is a 5-year survival of 30 per cent in $T_1$ tumors, which decreases to 23 per cent in $T_3$ tumors.

It has been suggested that the success of postoperative radiation therapy in controlling local disease is in part related to the interval between surgery and the beginning of irradiation. If disease is left in situ, and is confirmed histologically, such may be the case. Experience suggests that local recurrence occurs within the first 2 years postoperatively.

El Badawi and colleagues, reviewing the treatment of 418 patient with pyriform sinus cancer, reserved primary radiotherapy for $T_1$ and some $T_2$ tumors in patients at high risk for surgery or with inoperable neck disease. They found that the cancer had originated in the apex of the sinus in 90 per cent of patients, which suggests that true $T_1$ tumors must be rare. The majority of patients are now treated primarily with total laryngectomy and partial or total pharyngectomy. Preservation of pharyngeal mucosa must depend on assurance that submucosal disease is not left in situ. Reliance on postoperative irradiation to destroy residual microscopic disease is dangerous, particularly following reconstruction of the pharyngoesophageal segment.

The value of irradiation, both preoperative and postoperatively, has been clearly defined by Fletcher. He concludes that it rarely salvages surgical failure and its prime value may be in the case of the high-risk $N_0$ neck. However, his assumption that the "current surgical policy for pyriform sinus lesions involves removing the primary lesion without attempting to obtain a wide margin" is, I assume, recognition that in most instances wide margins are not feasible.

Although tumor extending onto the medial wall is accessible to surgery, extension superiorly into the pharynx is limited to surgical resection, and it is in the tongue base or the lateral pharyngeal wall that disease may be left.

Reevaluation of the operative specimens removed at total laryngectomy with partial or total pharyngectomy has shown, not unexpectedly, that in many instances part of the endolarynx is free from tumor. Freeman and colleagues concluded that 85 of 175 patients treated in this manner could have had some form of laryngeal conservative surgery. Kirchner, in contrast, considered that only 1 in 51 cases would have been suitable for such surgery. More recently, Dumich and co-workers examined 20 surgical specimens by whole-organ serial sectioning; 80 per cent had vocal cord fixation, with apex involvement in about 75 per cent. Invasion of the thyroid cartilage was present in just more than half of the specimens, and they concluded that 13 of the 20 specimens could have been treated by near-total laryngopharyngectomy.

Krespi and Sisson, in describing their operation of hemicricolaryngopharyngectomy, concluded that since anterior pyriform sinus lesions may involve only part of the homolateral hemilarynx, some $T_2$ and $T_3$ lesions are suitable for preservation of the contralateral half of the larynx. Their contraindications include extension of tumor to the apex of the sinus - a situation said to occur in 90 per cent of cases. There was no local recurrence in any of the 14 patients within a 6-month to 4-year follow-up.

Michaels and Gregor, in 1980, examined similar specimens and came to the conclusion that in both total laryngectomy and laryngopharyngectomy specimens, retrospective evaluation suggested that less radical procedures *might* have eradicated all microscopic tumor. When I carried out a similar investigation in 1970, my specimens were of more advanced tumors and the conclusions more closely matched those of Kirchner. With careful evaluation in the hands of those surgeons with skill and experience in near-total laryngopharyngectomy, conservation of laryngeal function probably plays some part in the management of a small number of pyriform sinus neoplasms. Long-term survival in patients with pyriform sinus carcinoma has beenshown

to correlate best with the nodal classification of disease, possibly because palpable neck nodes are found in at lest 60 per cent of patients at diagnosis. Although a palpable node in the neck of any patient with a primary carcinoma in the head and neck region is considered to be an advere prognostic factor, this assumes that all palpable nodes contain metastatic deposits. Normal lymph nodes within the neck vary in size from 2 mm to 2 cm. Moreover, not all enlarged lymph nodes contain metastatic deposits, and nodes that are misdiagnosed as being normal (particularly if bilateral) may lead to inadequate therapy.

Ali and associates have considered the incidence and significance of errors in classification in 430 neck dissections, including 23 from patients with pyriform sinus cancer. They concluded that the incidence of neck nodes that were misdiagnosed as normal was 20 per cent in this group, and since a palpable node occurring with a poorly differentiated squamous primary lesion is almost certain to be abnormal, neck masses in pyriform sinus tumors are invariably metastatic disease. Radical neck dissection is invariably followed by profound and permanent trapezius muscle weakness. In addition, pain in the shoulder region is common. Preservation of the spinal accessory nerve, although accompanied by some temporary weakness, avoids this troublesome complication. However, involvement by fixed nodes or a close relationship to suspected metastases may require sacrifice of the nerve. Carenfelt and Elijasson followed 80 patients with accessory-sparing radical neck dissections carried out after 4000 rad irradiation. In no case was cure compromised, although the significance of this remains unclear. As with most other head and neck cancers, there is a 60 per cent decrease in 5-year survival when the nodal status changes from $N_0$ to $N_1$. Any compromise in the surgical removal of neck metastases in order that trapezius function may be preserved will be hazardous!

Of more importance is the management of those patients presenting with no clinical evidence of disease in the neck. Although the practice of electively irradiating all patients with no clinical evidence of neck disease is condemned, evaluation of 540 neck dissection specimens by Marks and colleagues showed that tumor was more often present in the lymph nodes of patients with pyriform sinus cancer than in the nodes of patients with cancer of the larynx. This may be related to the high frequency of nonkeratinizing carcinoma or increased lymphatic density within the pyriform sinus. Evaluation of the success of combined treatment is complicated by the lack of detailed information relating to the pathologic extent of the primary tumor and extent of disease with neck dissection specimens. Radical excision of the primary pyriform sinus cancer, together with radical neck dissectin when palpable neck nodes are present, may be followed by routine radiotherapy. The latter may alternatively be given only when microscopic disease is left in situ or when no nodes are palpable in the neck ($N_0$). Most reports show that local recurrence at the primary site or in the neck occurs within the first 2 years postoperatively. After this time, death primarily results from second primary tumors or systemic metastases. Although Fletcher reported a failure rate of only 11 per cent above the clavicle in pyriform sinus cancers treated with combined therapy, 35 per cent of patients died within 2 years with systemic metastases. El Badawi and co-workers found most of their systemic metastases to occur in patients with $N_2$ or $N_3$ neck disease, and it appears generally accepted that neck control is paramount in long-term survival.

An overall 5-year cure rate of about 30 per cent appears to be common in most large series of pyriform sinus cancer. Control of macroscopic disease left at the margins of excision by postoperative irradiation is disappointing. However, irradiation of the small number of patients presenting with $N_0$ disease of the neck appears worthwhile, although the risk of long-term systemic metastases persists.

## Treatment of Posterior Pharyngeal Wall Cancer

In clinical practice, it is unrealistic to separate the postoperior oropharyngeal wall from that of the hypopharynx because of their intimate anatomic relationship. Early tumors are extremely uncommon, and spread to adjoining areas rapidly occurs, making these tumors difficult to control. Late presentation, together with a tendency to bilateral nodal involvement and the inaccessibility of the retropharyngeal lymph nodes, results in a poor survival rate. Combined therapy is hampered by the difficulties of adequate local resection together with the necessity of controlling bilateral regional metastases. Total pharyngolaryngectomy is usually carried out, although the necessity for removing an uninvolved larynx has been questioned. Techniques such as suprahyoid pharyngotomy, median labiomandibular glossotomy, and lateral pharyngotomy, all eminently suitable for benign lesions in this area, allow only limited access. A review of the technical details was reported by McNeill in 1981 with a combined suprahyoid and lateral approach used for 13 patients with carcinoma of the posterior pharyngeal wall. The larynx was preserved with an intact sensory nerve supply. There were problems with swallowing and despite a combination with radiotherapy, control of local disease was obtained in only one patient on short-term follow-up.

It is accepted that total laryngectomy serves primarily to assist in access; total pharyngolaryngectomy with high resection encompassing the retropharyngeal nodes appears essential to offer any prospect of control in tumors that are $T_2$ or greater. Both sides of the neck are at risk and require prophylactic radiotherapy in $N_0$ situations.

Deep invasion into the underlying prevertebral fascia, muscles, or vertebral bodies is difficult to detect. This is probably responsible for the 50 per cent incidence of local recurrence reported by Farr and Arthur when these lesions are treated by surgery alone. Clinical evidence of regional node metastases present at diagnosis and submucosal extension to the nasopharynx, palate, or tonsil is responsible for a gross 5-year cure rate of 19 per cent. Fletcher claims an improved figure of 60 per cent local control when primary irradiation is followed by salvage surgery for $T_3$ lesions.

## Treatment of Lesions of the Postcricoid and Cervical Esophagus

The postcricoid region extends from the posterior surface of the arytenoid cartilage and its connecting folds to the inferior border of the cricoid cartilage. The lateral margin is therefore the anterior part of the pyriform fossa. Although the incidence of cancer in this area is much less than in the pyriform sinus, Stell and Harrison have both accumulated personal series of more than 140 patients.

As with other tumors of the hypopharynx, patients tend to present late in the course of their disease, and 14 per cent have significant dysphagia for more than 1 year. Greater than 30 per cent have evidence of regional metastases, of which 8 per cent are bilateral.

The place of radiotherapy as primary treatment remains uncertain, for even with the uncommon early tumors (less than 5 cm in vertical length and without palpable nodes in the neck), 5-year survival was 38 per cent and included three patients requiring salvage surgery and seven patients with severe esophageal stenosis. Survival figures for radiotherapy vary from 0 to 30 per cent and illustrate varying selection criteria. The perfection of more effective radical surgical procedures has apparently led to radiotherapy being used mainly postoperatively in most centers for extraluminal disease or $N_0$ necks. Even when apparently successful, radiotherapy frequently leaves a stenosed hypopharynx with persistent dysphagia. Little evidence is available for its possible value preoperatively, since many patients are already malnourished, and the additional discomfort of a course of irradiation is rarely conductive to subsequent radical surgery.

Although postcricoid tumors greater than 5 cm in length carry a poor prognosis, probably because of an increased likelihood of extraluminal extension, wide resection with primary repair can provide effective rehabilitation. Extension superiorly, not included in present classification systems, is of more serious portent, as in tumors of pyriform sinus or posterior pharyngeal wall.

Whether pharyngolaryngectomy requires additional excision of the whole esophagus depends on the inferior extent of the neoplasm, for the risk of "skip" lesions or secondary esophageal tumor appears minimal. Involvement of the party wall between cervical esophagus and trachea may necessitate manubrial resection to avoid "stomal" recurrence, and this also allows clearance of accessible paratracheal lymph nodes.

An accessory-sparing radical neck dissection is carried out for palpable lymph node metastases and if necessary can be bilateral. However, this adds extra morbidity to the excisional surgery and is rarely curative. Postoperative radiotherapy to the $N_0$ neck would need to be bilateral and is rarely justified unless evidence of metastatic disease is discovered at initial surgery.

Patients with extensive disease, fixed nodes, poor general condition, or advanced age, who are deemed to be untreatable, have a life expectation of about 6 months.

Although there are now effective, safe surgical procedures available for repairing the pharyngolaryngeal or pharyngogastric gap, local control of postcricoid and cricoesophageal tumors remain a problem. Harrison's adjusted 5-year survival figure of 58 per cent indicates that potentially curable lesions can be treated surgically, although the risk of late systemic metastases remains even without evidence of local or regional disease.

Som, in 1956, reported an adequate oncologic operation for postcricoid and cervical esophageal tumors in which resection included only the posterior half of the larynx and upper trachea. This allowed the remaining portion of the larynx to be used in hypopharyngeal

reconstruction - a laryngotracheal autograft. More recently, this concept has been combined with the gastric "pull-up" repair to preserve some vocal function. By creating a semirigid mucosal speech tube from the remaining anterior half of the larynx and upper trachea, adequate vocalization has been obtained in five patients with $T_2$ to $T_3$ cricoesophageal tumors without compromising oncologic excision.

## Problems in Reconstruction

The evolution of head and neck surgery over the past century has been characterized by more effective attempts at ablating primary tumors, together with realistic efforts at restoring form and function. Nowhere has this evolution in technical ingenuity been more tested than in the management of hypopharyngeal cancer. Historically, the earliest attempts at reconstruction following pharyngolaryngectomy used local cervical skin followed by transposition of tubed skin flaps from the anterior part of the chest wall. Visceral interposition of stomach, colon, or jejunum were being used with limited success in the 1950s and 1960s, and it is these techniques that have been developed to meet an increasing need for an ideal reconstruction. This would allow resection of the cancer and restore the swallowing conduit in one stage, would employ tissue outside any field of irradiation, would not require thoracic or abdominal surgery, and would allow healing without troublesome morbidity from complications. As yet no procedure is available that meets all such criteria. However, a variety of established techniques are now available, and the head and neck oncologist must be conversant and skilled with them in order that the most appropriate operation may be offered to each patient. None is ideal, and there will be some degree of compromise in each case.

The reconstruction problem is to replace a cylinder of variable length, which is lined with mucosa and surrounded by smooth muscle, and cover the replacement with viable skin. The new gullet will be a nonperistaltic gravity conduit. Only tongue thrust and gravity initiate swallowing, which is adequate only if the new tube is flexible and free from anastomotic strictures. Many operations will be palliative because of failure to adequately remove all tumor. In the past, not only did multistage skin repairs frequently fail to produce a satisfactory swallow but also they were so delayed that most of the survival period was spent in hospital. The availability of immediate reconstructive methods has dramatically improved the rehabilitation of these patients, and it is these techniques that will be examined in more detail.

## Partial Reconstruction

Despite the inherent damage of submucosal disease or "skip" lesions, preservation of a 2-cm strip of posterior pharyngeal wall is occasionally possible. Fee is of the opinion that if the mucocutaneous junction is repaired "on stretch", the inherent distensitibility of the remaining strip of pharyngeal mucosa will allow good swallowing. Repair of the remaining defect with a pectoralis major myocutaneous flap, covered if necessary with a skin graft, is certainly technically easy, allowing primary reconstruction. Quilting, as described by Robertson and Robinson, has not been necessary in our hands, for the graft takes well on the well-vascularized muscle. However, the danger of disease left in situ makes partial pharyngectomy a dangerous option when repair

following total pharyngectomy is now a practical proposition.

## Total Reconstruction

De Santo and Carpenter have authoritatively reviewed the varied and imaginative surgical procedures that have been used to rebuild a functional pharynx and esophagus following circumferential resection. Most of the earlier methods have been abandoned, although there remains a place for the laterally based cervical skin flap credited to Wookey when there is doubt as to the upper level of resection. The pharyngostome created can be observed for local recurrence before closure with a myocutaneous flap at a later date. This avoids the disastrous situation of "buried" residual disease, but as with other primary skin repairs, it is not always suitable for cricoesophageal tumors. Cervical skin has, however, often been irradiated, and its survival may be precarious - even when not tubed, grafted, rotated, or covered. Multiple operations are often needed, and fistulas are common, as is stenosis. Both fistulas and stenosis may be secondary to technical errors, poorly placed sutures, too much tension, and poor construction of the skin-esophageal junction. Surkin and co-workers discussed 82 patients whose pharyngoesophageal reconstruction had been carried out with a variety of techniques. They reviewed the literature pertaining to reconstruction using local cervical flaps and found an overall operative mortality rate of 7 per cent. However, 94 per cent of patients had complications, including flap necrosis, fistulas, or stenosis. The usual period of hospitalization was 4 months, with at least three operations. The disadvantages of this otherwise safe procedure are (1) limitation of esophageal resection in some cricoesophageal tumors, although manubrial resection gives additional access, (2) viability of irradiated skin, (3) salivary flow from pharyngostome into the tracheostoma, and (4) prolonged hospitalization. However, in selected cases with doubtful margins of excision superiorly, such techniques still have a place.

The use of anterior chest wall skin for reconstruction dates back to the beginning of this century, although it was popularized in 1965 by Bakamjian. Tubed, medially based deltopectoral chest flaps enjoyed popularity until the development of the more dependable myocutaneous flaps in the 1970s. As with cervical skin, reconstructive complications were common (about 60 per cent) and hospitalization was lengthy. Flap necrosis secondary to poor technique, inadequate perforating vessels, or too long a flap caused considerable morbidity.

The superior properties of the myocutaneous island flap rapidly displaced the functionally inferior deltopectoral flap. The evolution of myocutaneous flaps is well documented and represents one of the most important contributions to head and neck reconstruction. Their use has been given major impetus by Ariyan, but Theogaras first reported its use in reconstructing five cases of postlaryngectomy esophageal stricture. In each case, a posterior mucosal strip was preserved, but total tubing of the pectoralis major flap was reported soon after.

With care, the flap has good vitality, the major limitations being the bulkiness in some individuals and the danger of tension of the vascular base, particularly in relation to the clavicle.

Because of low morbidity or the unavailability of teams equipped for visceral transplantation, the myocutaneous flap enjoys considerable popularity in closing total or partial pharyngoesophageal defects. An excellent blood supply allows reliable transfer of large amounts of skin without delay. Closure of the donor site is possible without grafting, and the muscular portion of the flap can be skin grafted at the time of the original operation if neck skin has to be sacrificed. Bulky flaps may be difficult to tube and cannot be thinned primarily with safety. Hematoma, particularly in the anterior chest wall, is common, as are fistulas. Difficulties, particularly with bulky flaps or low resections, at the inferior mucocutaneous junction lead to stenosis. In the series of Stell and colleagues consisting of 29 patients, 25 of them had a temporary fistula, and 16 patients developed stricture at the lower anastomosis, requiring dilatation. The average period of hospitalization was 3 months. With increasing experience and better care selection, many of these complications will decrease, and this method remains both useful and safe.

The latissimus dorsi myocutaneous island flap has been less popular but was used by Yamamoto and co-workers in 14 patients requiring reconstruction. They reported no postoperative stenosis, and only two patients had small fistulas.

There can be little doubt that a myocutaneous island flap fulfills most of the fundamental requirements for rapid restoration of function following pharyngolaryngectomy. Many minor modifications have taken place as a result of experience and have been well described by Fabian and Schuller.

However, wider resection, better swallowing, and shorter hospitalization are probably obtained by some form of visceral interposition, and it is with these techniques that the greatest developments have occurred within the last decade.

## Visceral Interposition

Colon, stomach, and jejunum, either with vascular pedicle or revascularized in the neck, are the three hollow viscera that have been used with varying degrees of success.

In 1954, Goligher and Robind described the successful transfer of the transverse and left colon to the pharynx following pharyngolaryngectomy. During the next decade, sporadic reports appeared of a small number of patients in whom colon was used for reconstruction. The extrathoracic subcutaneous route is now of historic interest, since it require the mainly liquid diet to be milked along its length. The retrosternal route is more popular but frequently requires resection of a sterno-clavicular joint to provide more room at the root of the neck. A remnant of esophagus is left in situ. The posterior mediastinal route provides the shortest pathway from pharynx to stomach and also allows total esophagectomy. However, the vascular pedicle may be compromised by compression from the bronchi.

Some surgeons have favored the right side of the colon because of its isoperistaltic nature, whereas the left side of the colon has a more reliable blood supply. Necrosis within the chest is

invariably fatal, and the variable supply of the colon has added to the hazards of this technique.

Although colon interposition has the advantage of (1) considerable available length, (2) long accessible blood vessels, and (3) mucosa that is easy to anastomose, there are many serious disadvantages. The colon has a tendency to become inert and easily distended. Two abdominal anastomoses are needed, adding to the risk of intra-abdominal complications. Fistulas and stenosis at the pharyngocolic junction seem to be common, suggesting that the blood supply at this level is not always adequate. Analysis of 267 cases from the literature treated by colonic interposition shows an operative mortality rate (usually defined as the patient not leaving the hospital) of 20 per cent, the rate remaining unchanged even within the last decade when increasing experience might have resulted in some improvement. The incidence of postoperative reconstructive complications remains close to 20 per cent and again showed little improvement. Approximately 8 per cent of patients experience the fatal complication of organ necrosis within the chest, possibly reflecting undetected inadequate vascular supply. As with other interposition techniques, the patients who do well have little trouble in swallowing, although the average duration of hospitalization is about 2 months.

The success of Nakayama and colleagues in the early 1960s with revascularization of free colonic grafts, led to a small number of free autografts being used for recostruction after pharyngolaryngectomy. However, complications were common, with almost one third of the bowels necrosing. This technique has now been successfully replaced by using revascularized jejunum.

### Stomach Interposition

Although the reversed gastric tube of Heimlich has been used in a small number of patients, it offers little of value in reconstruction after hypopharyngeal surgery. In 1960, Ong and Lee successfully mobilized and anastomosed the stomach to the pharynx in four patients following pharyngolaryngoesophagectomy for advanced laryngeal cancer. The anatomic basis for gastric mobilization in total esophagectomy was investigated by Thomas and co-workers who confirmed that the viability of the fundus was not dependent upon an anastomotic circulation involving the extragastric portion of the left gastric vessels. Unless there is an advanced atheroma in the right gastroepiploic artery, viability of the gastric fundus can be ensured entirely from the right gastric and gastroepiploic vessels. However, this anatomic study did not allow for the deformation and elongation of the stomach when passed up to the posterior mediastinum and then to the pharynx. However, necrosis of a small part of the fundus or fistulization from poor pharyngogastric anastomosis is uncommon in the larger series of "gastric pull-up" operations. Le Quesne and Ranger, in 1966, reported a small series in which the fundus of the stomach was anastomosed to the pharynx after pharyngolaryngoesophagectomy, but there were two deaths. Within the next 2 decades, increasing numbers of this operation were performed with varying success. Stell and associates had an operative mortality rate of 40 per cent, and Lam and co-workers, who were the originators of the procedure in Hong Kong, reported overall figures of 31 per cent, which were reduced to 18 per cent for more recent experience.

Similar high mortality rates were published initially, but with better case selection and increasing experience, these figures have been reduced to a more acceptable level. Harrison reported a figure of 11 per cent for his first 101 cases, with an average hospital stay of 2 weeks. Complete oral feeding was expected on discharge. Regurgitation may occur in about 20 per cent of patients, although this varies with diet and ethnic origin. The proportion of patients requiring long-term thyroxine supplementation is related to the amount of thyroid gland removed, which also affects calcium metabolism. Parathyroid gland transplantation after total thyroidectomy in three patients treated by a gastric "pull-up" procedure has been reported by Freeman and colleagues with successful return of parathormone secretion. However, total thyroidectomy does not necessarily indicate total parathyroidectomy unless superior mediastinal dissection is also performed. This combination, with clearance of the superior mediastinum, allows lower resection of trachea and removal of paratracheal nodes without increasing morbidity rates. Long-term rehabilitation is good, although, as with use of the colon, speech acquisition is poor.

The advantages of gastric transposition are (1) removal of the entire esophagus, thus minimizing the risk of multicentric lesions; (2) one stage and one anastomosis with good healing, even in irradiated patients; (3) low rate of fistula or pharyngogastric stenosis; and (4) the stomach accepts skin grafts after resecting cervical skin. There are few disadvantages except the intrinsic risk of all abdominal operations enhanced by the transthoracic immobilization, which is reponsible for the major reported complications. An overall mortality rate of 8 per cent is reported for 146 operations by a variety of surgeons. Stenosis and fistulization is an uncommon complication, and in experienced hands this is a successful operation allowing wide inferior resection and good rapid rehabilitation.

### Jejunum Interposition

Successful viscerap interposition with small intestine has primarily consisted of revascularized autografts of jejunum. The short jejunum mesentery requires several loops of bowel to be transposed to maintain an intact vascular pedicle. Allison, in 1959, successfully transposed a Roux loop of jejunum to the pharynx following resection for a postcricoid carcinoma, but present-day success lies with the use of autografts. Seidenberg and colleagues described the use of revascularized jejunal autografts for esophageal reconstruction in dogs in 1959 and in a few sporadic case reports during the next decade. My own three cases, reported in 1964, were all successfully revascularized, but poor selection resulted in disease left in situ at the lower end of the resection.

Resurgence of interest awaited increased skills and interest in microvascular surgery. Details of present-day technique have been published by Gluckman and colleagues, and in a series of 52 patients, a graft failure of 7.6 per cent was obtained, with no operative mortality. The overall success rate was 90 per cent, and their detailed paper described the complications associated with harvesting the graft as minimal and discussed the graft placement and the importance of early diagnosis of necrosis. This paper clearly illustrated the value of the technique but contained little long-term follow-up, particularly with relationship to local recurrence.

An analysis of 72 patients was presented in 1986 from Brisbane, Australia, with only two graft losses and a fistula rate of 11.1 per cent. Swallowing occurred in an average of 13 days, and there was a hospital mortality rate of 2.8 per cent. All patients had radical doses of radiotherapy, and many had preoperative chemotherapy - again, no long-term follow-up was included.

Revascularization within the neck uses the superior thyroid, lingual, or facial artery to the jejunal artery. Venous anastomosis to the external jugular or common facial vein presents little difficulty. Since Surkin and colleagues analyzed reported cases in 1984, there has been the expected drop in autograft necrosis and overall complication rate. Originally 16 per cent, the incidence of autograft failure in the larger series is now about 7 per cent. Reconstruction complications have fallen from 35 to about 20 per cent.

The advantages of a free jejunal graft include (1) the technical ease with which it is obtained and revascularized, particularly when using a stapler for the lower anastomosis; (2) the fact that it is a single-stage procedure with low morbidity and short hospitalization; (3) its reliability although it is still accompanied by some potentially serious complications; and (4) the fact that there is good swallowing early.

As with all other reconstructive techniques used for hypopharyngeal cacer, speech rehabilitation is poor. Originally viewed with some suspicion because of the high graft failure, inadequate resection, poor swallowing, and other complications, there can be little doubt that revascularized jejunum now plays an important role in reconstruction of the pharyngoesophageal segment. Careful patient selection is as essential as it is with all other major surgical procedures, with excision of the tumor continuing to exercise priority over method of reconstruction!

## Second Malignant Neoplasm

It has been recognized for some time that in patients with head and neck cancers there is a greater than average risk of a second malignant neoplasm developing. The decrease that is consequent on more effective cotrol at the primary site is now offset by the later development of often fatal second tumors. Synchronous carcinomas are those developing within 6 months of the primary lesions; metachronous tumors develop after that time.

The mucosa of the upper aerodigestive tract is vulnerable to a wide range of exogenous ingested and inhaled carcinogens. They are probably associated with promoting factors, such as alcohol and tobacco abuse, and it is within this concept of field cancerization or multicentricity that many second neoplasms arise. Vickram and colleagues examined the incidence of second malignant tumors in 114 advanced carcinomas of the oral cavity, laryngopharynx, and larynx in 16 patients in whom second neoplasms developed; 7 tumors were in the esophagus (44 per cent) and 6 tumors occurred in the lungs (37.5%). Mouth, pharynx, and larynx are the most common sites, possibly reflecting "at-risk" mucosa. In patients who do not return with growth of residual local disease, second malignancy may continue to appear at a steady rate of approximately 6 per cent/year and now poses a considerable problem in apparently cured laryngopharyngeal tumors.

The improvement in local control rates has not been matched by significant improvements in long-term survival rates. Patients who no longer die of inadequately controlled local disease now live long enough for there to be a substantial risk of a second neoplasm developing. In addition, many patients experience systemic metastases. Five-year survival, therefore, no longer implies absolute cure, and follow-up must be for life. The mucosal atypia commonly found within the hypopharynx supports the concept of total pharyngolaryngectomy, and some additional benefit may be gained by the total esophagectomy that is an intrinsic part of the gastric "pull-up" operation. As yet, jejunal revascularization patients have not been followed in sufficient numbers or for long enough to establish the possible risk of second esophageal neoplasms.

Systemic metastasis was the most common cause of death occurring more than 7 months after surgery in Harrison's 101 patients treated by pharyngolaryngoesophagectomy. As yet, there is no evidence to support the value of concomitant or postoperative chemotherapy in reducing this fatal situation. Indeed, the immune depressant effect of such agents may well increase the rate of systemic metastases!

## Mortality and Survival After Hypopharyngeal Surgery

In reviewing 362 cases collected from the literature of the past 23 years for patients receiving pharyngoesophageal reconstruction after oncologic surgery, Stell and colleagues found a hospital mortality rate of 25 per cent. This was increased by previous radiotherapy, poor general condition, method of reconstruction, and increasing N stage. Not surprisingly, reconstruction requiring intra-abdominal surgery was the most dangerous, although when successful it was spectacular.

It is a reflection on the improvement in surgical skill and patient selection that both operative mortality and reconstructive success have now improved considerably. However, technical expertise is still essential, for many patients are poorly nourished, elderly, and afflicted by systemic ailments. Not only must adequate excision of the primary tumor be the prime objective but also reconstruction must be chosen for its best option for each patient.

The advanced state in which many hypopharyngeal cancers present and the technical difficulty of controlling local and regional disease make survival times an unrealistic measure of reconstructive quality. Trouble-free swallowing is the best measure of palliation, and stomach is certainly resistant to ingrowth from residual disease in neck or superior mediastinum. Provided that uncontrolled nodal disease is not left in situ, the gastric "pull-up" technique offers realistic palliation, but even in experienced hands this operation carries a higher mortality rate than does jejunal revascularization. However, jejunal or skin interposition is less resistant to invasion fromtumor inadvertently left in the neck or superior mediastinum. Little in the way of long-term successful palliation is recorded for repair using anything other than stomach, and this factor must be considered when operating on advanced neoplasms when palliation is the primary objective.

One might well remember the words of John Conley in his Hayes Martin Lecture of 1983: "New ideas and new operations possess an evangelical beauty, but are infrequently proved and

are not necessarily better". Control of the primary lesion is the most important goal in the management of any hypopharyngeal tumor. This is impossible, particularly superiorly, in many patients. A choice of effective reconstructive techniques is available, but they all require considerable technical expertise and experience. Palliation is possible only if trouble-free swallowing without pain can be instituted - many patients cannot be helped! Unhappily, the fundamentals of excisional surgery within the head and neck have changed little during the past 30 years - this applies particularly to tumors arising within the hypopharynx for which prevention is certainly more profitable than attempts at cure!