

Radical neck dissection for squamous cell carcinoma of the head and neck: early and long-term results of treatment

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Key words: NECK DISSECTION; SURVIVAL; PALLIATION

Summary

An account is given of the use of radical neck dissection in a consecutive series of 147 patients treated during the years 1967–76 in the Head and Neck Unit of the Royal Marsden Hospital. The majority had received previous treatment principally by irradiation to full dosage, some by previous surgery, and a minority by induction cytotoxic chemotherapy. The 5-year determinate survival results for surgical salvage are 28.03%, and 20.5% at 10 years. Prevention of recurrent cancer in the neck was achieved in 70% of all those who later succumbed to their disease.

Introduction

The historical basis of block dissection of the neck lymphatics for cancer, or radical neck dissection, goes back approximately 100 years although knowledge of the ability of oropharyngeal cancer to spread to 'cervical glands' was evident from medical records of the early 19th century. Credit for first designing and practising a system of neck dissection is properly given to G Crile Snr (1906) (5) who based his work on the earlier propositions of Kocher (1880) (8) and Sir Henry Butlin (1900) (2). But the true value of neck dissection and its surgical standardisation must be given to Hayes Martin (11). It remains today, modified by increased knowledge to suit differing situations, the most effective method of treating head and neck cancer metastatic to the cervical lymphatics.

This paper seeks to evaluate the use of classical radical neck dissection when applied to advanced squamous cancer of the head and neck, frequently as part of a salvage procedure.

Clinical material

During the 10-year period January 1967–December 1976, 169 radical neck dissections were performed on 147 patients with primary cancer at head and neck sites under the care of one surgeon in the Head and Neck Unit of the Royal Marsden Hospital. Of these, 108 (74%) were male and 39 (26%) were female. The age range was 27–77 years with a median age of 54. The operations were performed either as the sole surgical procedure required, or as part of a composite (Commando) resection. In view of the advanced or recurrent nature of the disease in these patients any

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conservation or functional dissections were felt to be unsuitable (10, 13).

We have examined the outcome of these procedures in an attempt to reach an understanding of the end-results to be expected when radical neck dissection is performed for squamous cancer of the head and neck, and some of the factors which might influence the benefit of treatment in such patients.

In considering the long-term surgical end-results for the purposes of this paper, 15 patients who had 17 neck dissections are classified as indeterminate or ineligible. Of these, 3 were untraceable after less than 5 years, and 6 died of intercurrent disease within 5 years, 5 being free from head and neck cancer at the time of death. Six further patients treated for non-squamous carcinoma have also been excluded. This leaves a total of 141 patients eligible for study and a determinate group of 132 patients with squamous carcinoma who had 152 neck dissections. Of these, 101 patients (76.5%) had received prior full dosage irradiation to the neck and a number had also received previous surgical treatment. The majority of operations, therefore, were of a salvage nature. Because so many were treated for recurrent disease attempts at precise clinical staging did not seem appropriate for the purposes of this study although all cases should be considered in Stage III or IV.

The sites of the primary tumours are shown in Table I. Four patients developed a known metachronous second primary carcinoma, but in only two cases was this lesion in the head and neck region.

Treatment policy

In general, it has been policy in the Head and Neck Unit to perform neck dissection for the following indications and accompanying conditions:

- (i) Clinically evident metastatic involvement of the neck nodes when judged to be therapeutically resectable. The primary lesion having been controlled or being removed at the same time as the neck dissection.
- (ii) Occult primary cancer metastasising to the neck nodes, operation being part of combined treatment with external irradiation.

TABLE I Site of primary squamous cell carcinoma in 132 determinate cases

| Site | Incidence/132 | % |
|-------------------------|---------------|------|
| Oral cavity | 61* | 46.2 |
| Larynx-supraglottic | 20 | 15.2 |
| Hypopharynx | 16 | 12.1 |
| Oropharynx | 8 | 6.1 |
| Larynx-glottic | 8 | 6.1 |
| Larynx-transglottic | 6 | 4.5 |
| Larynx—site unspecified | 5* | 3.8 |
| Face | 5 | 3.8 |
| Occult primary | 2 | 1.5 |
| Salivary gland | 2 | 1.4 |
| Larynx-subglottic | 1 | 0.7 |
| Total | 134 | 100 |

* Second primary tumours sited in the head and neck occurred in only 2 patients: one in the oral cavity, the other laryngeal.

(iii) When resection of the primary tumour requires an approach through a clinically uninvolved neck (ie dissection for 'surgical access').

(iv) An 'elective' dissection which was performed only in the following circumstances: When the patient's build or previous irradiation made confident assessment of the nodal status difficult. When the primary tumour exhibited markedly unfavourable prognostic characteristics, and when adequate close follow-up was felt to be difficult for geographical or social reasons.

(v) Operation should offer a more certain chance of cure than irradiation.

(vi) There should be no clinical or X-ray evidence of distant metastases.

(vii) The general condition of the patient should permit a major operation.

The relative frequency of the main indications for neck dissection and the incidence of histologically proven metastatic disease in the neck are shown in Table II. This allowed an estimate of the accuracy of the clinical assessment of the neck. The overall accuracy was 87%, with a 10% false positive and 5% false negative incidence.

TABLE II Indications for neck dissection and accuracy of clinical assessment of nodal status in 152 necks

| Indication | Incidence | Histologically proven metastatic nodal disease | Accuracy (%) of clinical assessment of nodal disease |
|--------------------------|-----------|--|--|
| Neck clinically involved | 104 | 94 | 90 |
| 'Surgical access' | 32 | 5 | 84 |
| Elective | 14 | 3 | 80 |
| Occult primary | 2 | 0 | N/A |

End-results

There was an operative mortality of 12 patients (7.9%) being defined as death within 1 month of operation. Six died of bronchopneumonia, 3 died from acute myocardial infarction, 1 from an unexplained cerebrovascular accident following a unilateral dissection, 1 from massive early post-operative haemorrhage causing asphyxiation, and 1 from acute laryngeal oedema following surgery for residual malignant nodal disease after radiotherapy. No elective tracheostomy was performed for these last 2 patients. This relatively large operative mortality is mainly due to the salvage nature of much of this surgery in high risk patients with advanced disease. Most of the operations were also of the composite or Commando type in heavily irradiated tissues.

FIVE-YEAR SURVIVAL

Of the 132 determinate patients, 79 (59.8%) died of recurrent cancer within 5 years of surgical treatment. There is no information regarding the site of recurrence in 6. The site of recurrent disease in the remaining 73 patients (84 neck dissections) is given in Table III. It can be seen that neck dissection was effective in preventing recurrence of cervical cancer in about 70% of all patients who died of disease within 5 years of surgery. On analysis, the ability to palliate neck disease in these short-term survivors was not significantly affected by pre- or postoperative radiotherapy.

TABLE III Site of recurrence in 73 of the 75 patients who died from recurrent disease within 5 years of surgery (84 neck dissections)

| Site of recurrence | Incidence/73 | % |
|--------------------|--------------|------|
| Local alone | 25 | 34.2 |
| Distant alone | 22 | 30.1 |
| Neck alone | 13 | 17.8 |
| Neck and local | 6 | 8.2 |
| Distant and local | 4 | 5.5 |
| Distant and neck | 3 | 4.1 |

Of the 37 5-year determinate survivors (28.03%) (Table IV), 6 were not followed for a further 5 years. Two of these patients were lost to follow-up free of cancer at last attendance, 2 died from intercurrent disease, but were free of cancer at the time of death, 1 died from recurrent cancer in the neck, and 1 from distant metastases (the head and neck were free of cancer in this patient).

TABLE IV End-results of treatment

| | |
|--|-----|
| Total number of patients eligible for study: | 141 |
| Indeterminate results | 9 |
| Lost track without cancer | 3 |
| Dead of other causes without cancer | 6 |
| Determinate results | 132 |
| (a) Failures | 95 |
| Dead as a result of operation | 12 |
| Dead as a result of cancer | 79 |
| Dead of other causes with recurrence | 3 |
| Alive with recurrence | 1 |
| (b) Successes | |
| Recurrence free after 5 years | 37 |
| Recurrence free after 10 years | 15 |

Conclusions

Absolute 5-year survival rate: $37/141 = 26.24\%$
Determinate 5-year survival rate: $37/132 = 28.03\%$
Determinate 10-year survival rate: $15/73 = 20.5\%$

TEN-YEAR SURVIVAL

Of those patients undergoing surgery prior to January 1972, 15 (20.5%) survived 10 or more years after surgery and required a total of 19 neck dissections. Eleven of these patients (73%) had Stage III disease at the time of presentation. Preoperative radiotherapy had been used in 11 patients (73%), and almost the same percentage in the whole determinate group had likewise been irradiated. Nine patients (60%) in this sub-group had a primary carcinoma in the oral cavity which was the primary site in 46.2% of the whole determinate group. This suggests a higher cure rate was achieved for patients with carcinoma of the oral cavity than might have been expected. The overall 10-year determinate survival rate for the 28 patients with carcinoma of the oral cavity who underwent a neck dissection was 32%. However, the numbers of patients who were treated in these subgroups were small.

SURVIVAL AFTER INDUCTION CHEMOTHERAPY

In the whole series of 141 patients 29 received initial cytotoxic chemotherapy (Price-Hill Schedule A) prior to any other form of treatment. All of these patients had advanced local disease. In no case did this induction chemotherapy complicate surgery or affect postoperative mortality and morbidity. Three patients (10.3%) in this sub-group died postoperatively, 2 of bronchopneumonia following pharyngolaryngectomy and resection of the mouth floor respectively, and 1 of acute laryngeal oedema following block dissection for clinically residual disease after irradiation. Of the 26 survivors, 8 (30.8%) developed recurrent disease within 5 years. Four of these recurred at the primary site and 4 in the neck (1 had both cervical and distant recurrences). All patients with recurrence died of their cancer within a mean interval of 14.3 months following surgery and 22.1 months following diagnosis. Seven patients died during the period of follow-up without any evidence of recurrent cancer, 2 from cerebrovascular accidents, 2 from myocardial infarctions, 1 from a pulmonary embolus, 1 from bronchopneumonia, and 1 due to peritonitis caused by a second primary colonic carcinoma, with a mean survival of 18 months following surgery.

Twelve patients (41.4%) of the 29 receiving initial chemotherapy survived free of cancer for more than 5 years, one of whom has subsequently died of other causes free of recurrence. Eleven are currently alive and well at 10 years.

A further 5 patients at high risk had adjunctive chemotherapy shortly after radiotherapy or surgery. Only one of these latter patients survived more than 5 years.

These results reflect the favourable influence of cytotoxic chemotherapy on survival providing it is given as initial therapy to previously untreated patients (14).

Discussion

The total numbers of patients treated is not large but the majority of operations were carried out for recurrent cancer on a salvage basis after failure of previous treatment. Because of this and also because a number of studies of neck dissection in its various applications to larger numbers of previously untreated patients have been reported in detail, it was not considered useful to break this series down into smaller sub-groups to study the same relevant clinical parameters (1, 7, 11). An objective assessment in terms of survival and surgical palliation for patients with advanced cancer whose treatment required radical neck dissection was therefore considered more appropriate.

Bearing in mind the nature of the series it is not surprising to find a high operative mortality of 7.9%. Although in 2 of these 12 patients death may be attributed to the absence of elective tracheostomy, the remainder still reflect the patients' poor general condition, the effects of previous treatment, notably irradiation, and of prolonged composite operations to include one-stage reconstruction. The majority of authors of larger series of neck dissections report operative mortalities of 1-3% in previously untreated patients (1, 3, 11). By contrast Krause and his colleagues (9) point out that operative mortality is related to the type of operation, being up to 15% in their series for composite procedures. Despite these problems and that about 60% of the patients died within 5 years of recurrent cancer, in only 30% was disease recurrent in the neck. Prevention of further recurrence in the neck was therefore achieved in approximately 70% of patients who subsequently died of their disease. Behrs and Barber (1) report similar rates of control in a larger series of 606 operations.

In Table IV the end-results are set out to show a determinate 5-year survival rate of 28.03% and a 10-year rate of 20.5%. In the latter small group of 15 patients 6 had primary lesions arising in the oral cavity, perhaps reflecting only the high incidence of mouth cancer in the series. These results compare favourably with others especially when the salvage nature of the surgery and high operative risks are

taken into account (11). Strong, in 1972, gave an overall 5-year survival rate of 25% for 552 radical neck dissections for mouth and pharynx cancer (personal communication). Freedom from further cervical recurrence was shown to be 54%. Kalnins and colleagues (7) also show clearly in their series of 340 determinate cases that survival is closely linked to the extent and level of lymphatic involvement. This direct relationship between prognosis and degree of lymphatic invasion has also been shown convincingly by Cachin and colleagues (3). Of particular interest is the probable influence on survival of initial cytotoxic chemotherapy, 41.4% of 29 patients so treated initially before surgery and/or irradiation surviving 5 years free of disease. This figure might have been higher if 2 patients in the group had not died postoperatively of causes unrelated to chemotherapy. All were Stage III or IV at first attendance. It also bears out the similar results reported in other recent accounts of combined treatment using initial multi-drug chemotherapy in sequence or integrated with conventional treatment (12, 15).

Using this protocol (Price-Hill Schedule A) no complications or delays to subsequent conventional treatment, and no added problems of surgery or postoperative morbidity were encountered.

Conclusions

Experience with radical neck dissection for advanced squamous carcinoma of the head and neck has been reviewed over a 15-year period which allowed a long-term follow-up of 5-10 years in 141 patients who had 152 neck dissections.

Although operative mortality was 7.9% and related mainly to cardiopulmonary complications in a high risk series of patients, it was considered not unreasonable in such circumstances. Postoperative airway obstruction was avoided in the latter part of the series by the more frequent use of elective tracheostomy now considered mandatory in the post-irradiated patient.

Overall accuracy in clinical assessment of the nodal status of the neck was effective at 87% with a 10% incidence of false positives and a 5% false negative assessment rate.

Seventy-nine patients (59.8%) died of recurrent disease within 5 years, but, of these, surgical palliation with prevention of cervical recurrence was achieved in 70%. Pre- or postoperative irradiation appeared to have had no influence on the early control of neck node disease by surgery or on long-term survival.

At 5 years 28.03% of all patients remained alive and free of disease and 20.5% followed for 10 years also remained free of cancer. At least three-quarters of these had had advanced disease at presentation.

Significantly there were 12, 5-year disease-free survivors (41.4%) in the small sub-group of 29 patients having initial cytotoxic chemotherapy (Price-Hill Schedule A), and 11 (38%) remain alive and well at 10 years. It would seem that induction chemotherapy contributed to increased survival without additional morbidity. Operative mortality was similar whether chemotherapy had been used as first treatment or not. Of the 5 patients who received chemotherapy as an adjuvant following local conventional treatment, only 1 survived longer than 5 years.

These results confirm the value of radical neck dissection for salvage and palliation of patients with squamous cancer from mucosal sites within the head and neck region even after full dosage irradiation and previous surgery (4, 6, 16).

The authors wish to thank Miss Barbara Brent for her care and skill in the preparation of the manuscript.

References

- 1 Behrs OH, Barber KW. The value of radical dissection of the neck in the management of cancer of the lip, mouth and larynx. *Arch Surg* 1962;85:65.
- 2 Butlin HT, Spencer WG. *Diseases of the tongue*, 2nd ed. London: Cassell & Co Ltd, 1900.

- 3 Cachin Y, Guerrier Y, Pinel J. Rapport du Societe Francaise d'Otolaryngologie. Les adenopathies cervicales neoplastiques 1969. Part IV, 167-87.
- 4 Conley J. Radical neck dissection. *Laryngoscope* 1975; 85,II:1344-52.
- 5 Crile GW. Excision of cancer of the head and neck. With special reference to the plan of dissection based on one hundred and thirty two operations. *JAMA* 1906;47:1780-5,1785-6.
- 6 Gardham AJ. In Discussion on palliative surgery. *Proc R Soc Med* 1964;57:123-8.
- 7 Kalnins IK, Leonard AG, Sako K, Rajack M, Shedd DP. Correlation between prognosis and degree of lymph node involvement in cancer of the oral cavity. *Am J Surg* 1977;134:450-4.
- 8 Kocher T. Ueber Radicalheilung des Krebses. *Deutsche Zeitschr für Chir* 1880;13:134-66.
- 9 Krause LG, Moreno-Torres A, Campos R. Radical neck dissection. *Arch Otolaryngol* 1971;94:153-7.
- 10 Lingeman RE, Helmus C, Stephens R, Ulm J. Neck dissection, radical or conservative. *Ann Otol* 1977;86:737-44.
- 11 Martin H, Del Valle B, Ehrlich H, Cahan WG. Neck dissection. *Cancer* 1951;4, 3:441-99.
- 12 O'Connor D, Clifford P, Dalley VM, Durden-Smith J, Hollis BA, Calman FM. Long term results of V.B.M. and radiotherapy in advanced head and neck cancer. *Int J Radiat Oncol Biol Phys* 1982;8:1525-31.
- 13 Pointon RCS, Jelly GO. Block dissection of the neck for squamous cell carcinoma of the mouth and lips. *Proc R Soc Med* 1976;69:414-16.
- 14 Price LA, Hill BT. Safe and effective combination chemotherapy without cis-platinum for squamous cell carcinoma of the head and neck. *Cancer Treatment Reports* 1981;65 (Supp 1):149-54.
- 15 Shaw HJ, Price LA, Hill BT. Treatment of advanced squamous cell carcinomas of the head and neck with initial combination chemotherapy prior to surgery and/or radiotherapy. *J Laryngol Otol* 1984;98:75-82.
- 16 Williams RG. Recurrent head and neck cancer: the results of treatment. *Br J Surg* 1974;61:691-7.

Notes on books

A Colour Atlas of Chest Trauma and Associated Injuries Vol. 2. by Augustin Besson and Frederic Saegesser. 336 pages, illustrated. Wolfe Medical, London. £48.00.

The first volume dealt with general conditions such as crush injury of the chest, penetrating and perforating wounds, blunt trauma and pulmonary trauma. In the second volume, injury to the trachea and major bronchi, cardiac and pericardial trauma and injury to the thoracic aorta and great vessels are dealt with also discussion of trauma to the diaphragm and oesophagus. As in all the books in the series, the colour photographs on the whole are of excellent quality and in addition many excellent radiographs are shown, if necessary, with line drawings labelled to improve interpretation.

Atlas of Standard Surgical Procedures by W V McDermott, Jnr. 193 pages, illustrated. Lea and Febiger. Philadelphia (Quest Publishing Agency, Kent) \$52.25.

The basis of this book of Standard Procedures is simple line drawings, well-labelled, together with a short text and points of particular importance placed in well-marked sections of the text as warnings to the reader. As the title implies, the text is operation-based.

Current Concepts in Hand Surgery edited by J A Boswick Jnr. Lea and Febiger, Philadelphia (Quest Publishing Agency, Kent) 287 pages, illustrated. \$41.25.

Much of the material for this book was presented at an international seminar on Hand Surgery held in July 1981 in Colorado. The book starts with a review of the functional anatomy of the hand, the mechanics of splinting and tendon transfer followed by chapters on various injuries and other conditions.

Head and Neck Cancer edited by P H Rhys Evans, P E Robin and J W L Fielding. 261 pages, illustrated. Castle House publications, Kent. £29.50.

The first section deals with the epidemiology and associated factors including oral pre-cancer and the Epstein-Barr virus related to naso-pharyngeal carcinoma. The second section deals with pathological aspects and the third part is devoted to recent trends and advances in tumour management including chemotherapy, laser surgery, neutron beams and multi-modal treatment. Chapters are devoted to flaps in the reconstruction of defects following the treatment of head and neck cancer.

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