Assessment of Margins in Resection Specimens for Head and Neck Malignancies

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ABSTRACT

Objective: To determine the relative frequency of clear, close and involved margins in resection specimens for head and neck malignancies.

Study Design: An observational study.

Place and Duration of Study: The Department of Oral and Maxillofacial Surgery, Armed Forces Institute of Dentistry, Rawalpindi and the Department of Histopathology, Armed Forces Institute of Pathology, Rawalpindi, from January 2008 to December 2010.

Methodology: Tumour registers and computer data bases in the department of Histopathology of Armed Forces Institute of Pathology, Rawalpindi, were analyzed for the cases of malignancies involving head and neck region that were sent for histopathological analysis after resection in the last three years. Histopathology reports were obtained. The data regarding age, gender, site, type of malignancy and margin status (clear, close or involved) was recorded on specially designed proformas for the study and later on analyzed by using SPSS version 17.0. Results were expressed.

Results: A total of 319 cases were registered in the study duration. The age of the patients ranged from 22 – 90 years (mean 59.5 ± 14.1 years). Male to female ratio was 1.53:1. One hundred and thirty six (42.6%) were squamous cell carcinoma (SCC), 163 were basal cell carcinomas (BCC, 51.0%); the rest included 18 salivary gland malignancies (5.7%) and one carcino-sarcoma (0.31%) and chondrosarcoma each. All margins were found clear in 137 patients (42.9%); involved in 168 cases (52.7%) and close in 14 cases (4.4%).

Conclusion: Margin clearance could not be achieved in more than 50% cases, this can lead to poor prognosis. Hence, methods should be adopted to improve the margin clearance in various head and neck malignancies.

Key words: Surgical margins. Oral cancer. Squamous cell carcinoma. Head and neck. Malignancy.

INTRODUCTION

Surgery is considered to be the primary mode of treatment of head and neck malignancies¹ and the ultimate aim of a surgical resection is to obtain tumour free margin.² It is often not possible to exactly delineate the area involved by tumour per operatively. Multiple options including the use of Toluidine blue,³ Lugol's iodine,⁴ frozen section,⁵ Moh's micrographic technique,⁶ gene probe assessment for p53⁷ and intra operative navigation system utilizing PET/CT fusion⁸ are being practiced by the surgeons to improve per operative control of margins to varying degrees.

Margins are said to be clear if histologically a distance of 5 mm or more exists between invasive carcinoma and the surgical margin, close if distance is 1-5 mm and involved if this distance is less than 1 mm or there is a cut through at the margin.⁹ Microscopic tumour at or close to the resection margin increases loco-regional recurrence by a factor of two or more and hence is considered to be a strong predictor for prognosis of the disease.¹⁰,¹¹ Histopathology report showing involvement of margins suggests that the tumour has been left behind and the resection was inadequate so that the patient has to undergo either re-excision of the primary site or adjuvant therapy in the form of chemo / radio-therapy,¹² each modality having its own pros and cons.

The aim of the current study was to determine the relative frequency of clear, close or involved margins in the resection specimens from head and neck region, both extra oral as well as intra oral sites.

METHODOLOGY

The study was carried out from January 2008 to December 2010 as a retrospective observational study. Tumour registers and computer data bases from the Department of Histopathology were analyzed for the cases of malignancies involving various head and neck sites (both extra oral and intra oral), that were sent for histopathological analysis after complete resection during the above mentioned 3 years.
Only the cases of malignancies involving the head and neck region with complete biographic data and histopathology reports were included in the study while those with incomplete reports in terms of biographic data or comments on margin status were excluded from the study. Detailed histopathology reports were obtained from the records and their print outs/copies were made. The data regarding age, gender, site and type of malignancy and margin status in terms of clear, close and involved as well as the status of underlying bone (where applicable) was recorded on specially designed proformas and later on analyzed by using Statistical Package for Social Sciences (SPSS) version 17.0.

For intra oral sites, margins were categorized as 'mucosal' and 'deep' while in extra oral sites they were referred to as 'peripheral' and 'deep'. The formalin fixed tissue specimen was examined grossly and then oriented for histopathology examination. The margins were painted with India ink. The sectioning of the tissue was done and peripheral or mucosal margins and deeper section of the tissue was taken. Microscopic examination was done once the Hematoxylin and eosinophilic slides were ready. Type and grade of tumour was diagnosed and involvement of margins were noted. Margins were considered clear when no tumour was present within > 5 mm of the resection margin, close when tumour existed within 1 – 5 mm and involved when the tumour encroached on the resection margins and the distance was either less than 1 mm or there was a cut through of tumour. In case of bone, status of the bone and periosteal margins in demineralized tissue section was recorded.

## RESULTS

A total of 319 cases of resected malignancies were sent to the histopathology department during the study period involving various head and neck sites. Out of these, 193 patients were male and 126 female with an overall male to female ratio of 1.53:1. The age of the patients ranged from 22 – 90 years (mean 59.58 ± 14.11 years).

Regarding diagnosis, 136 (42.6%) out of the 319 cases were various grades of squamous cell carcinoma, 163 (51.0%) were basal cell carcinoma, 18 (5.7%) were salivary gland malignancies, one case (0.31%) each was of carcino-sarcoma and chondrosarcoma. Out of these 319 cases, 75 (23.5%) cases involved various intra oral sites while 244 cases (76.5%) involved multiple extra oral sites. Site distribution is given in Table I.

When the margin status was analyzed, it was observed that in only 137 (42.9%) patients complete margin clearance was achieved. On the contrary, in 73 (22.9%) patients one of the surgical margin (mucosal/peripheral or deep) was involved while in 95 patients (29.8%) more than one margin was found involved. In 14 (4.3%) cases surgical margins were found to be close (Figure 1).
The hard palate/maxilla, soft palate and retro molar areas depicted greater frequency of margin positivity (Table II). Similarly, in extra oral sites, chin, ear, nose and eyelids were the areas where greater degree of involvement was seen (Table III).

DISCUSSION

One of the most important but difficult aspect of cancer surgery is ensuring complete removal of the tumour at the primary site and inability to do so renders patient with a two-fold increase in loco-regional recurrence. Close or involved surgical margins suggest that disease is left behind and are considered an indication of adjuvant therapy. International Union for Cancer Control (UICC) defines margins as R0: microscopically no residual tumour, R1: microscopically residual tumour, R2a: macroscopically residual tumour histologically not assured, R2b: macroscopically residual tumour histologically assured and Rx: not known. Per operatively surgeons employ various modalities and techniques like metric approach, barrier approach, metric-barrier hybrid approach or use Toluidine blue, Lugol's iodine, frozen section etc. to assess margin clearance, each having its own sensitivity and specificity.

The age of the patients in this series ranged from 22-90 years (mean 59.5 ± 14.1) and this was found to be in accordance with studies by Kumar et al. and Bin Ahmed et al. Overall male to female ratio in these group was 1.53:1, when this was compared with other studies from Bin Ahmed et al. and Pandey et al. the results were almost similar.

In literature 0 – 52% margin involvement has been reported by various authors. In this series, only 42.9% cases showed complete clearance while in 52.8% cases margins were found to be involved and out of the involved cases, almost half showed more than one positive margin. Only a meager percentage (4.4%) presented with close margins. Similarly, a local study on gastric carcinoma also found that in 29% cases margin clearance could not be obtained.

In the present group, 46 out of 75 intra oral cases included bone in the resected specimen. Out of those 46 cases, 14 had involved bony margins (30.4%). There are various proposed methods in literature to predict mandibular involvement and to improve marginal clearance of bone. These include OPG, CT scan, PET/SPECT, frozen section assessment of cancellous bone.

When the frequency of involvement according to various intra oral and extra oral sites was studied, it became evident that some sites depicted greater percentage of involvement as compared to others. In intra oral cases, it was the malignancies affecting maxilla and retromolar region where it was difficult to obtain disease-free margins. Similarly, in malignancies involving the chin, eyelids, ears and nose, there was a greater frequency of margin positivity. According to Conway et al., these sites are considered to be high risk sites because of underlying embryonal fusion planes resulting in skin and subcutaneous tissue having less resistance to tumour invasion and spread. A possible reason for increased frequency of margin involvement in these sites could be that these are important facial areas and surgeons may have adopted a less aggressive approach while resecting in order to decrease the resulting facial deformity.

Overall, this study showed much greater number (> 50%) of cases with inadequate resection than other comparable studies. The possible reasons for such a huge number of cases with involved margins could be increased number of patients undergoing surgery with T3 or T4 lesions, anatomical constraints not allowing the surgeon to take complete 1 cm margins all around, not using high definition CT pre-operatively to determine the depth of tumour, not relying on frozen section per operatively to assess the margin clearance or artefactual shrinkage of the resection specimen when fixed in formalin leading to interpretational error in histopathological assessment. According to Cheng et al., this artefactual shrinkage can be up to 30%.

Ideally, this study should have included a 5 years follow-up of all the cases in order to show whether this has got prognostic significance or not, but as this is a retrospective analysis and hence it was not possible to trace the patients from the existing data. While performing oncological surgeries, the surgeon must bear in mind the ultimate aim, which is to obtain margin clearance and every effort should be made to achieve this aim in order to improve loco-regional control, to enhance prognosis and to decrease extra burden on the oncological units providing postoperative chemo and radiotherapy to these patients.

CONCLUSION

In more than 50% cases of this studied head and neck malignancy, margin clearance could not be achieved, compromising the oncological treatment principles. This can lead to decreased loco-regional disease control, increased chances of recurrence and an overall poor prognosis.

REFERENCES


