Management of Post-Operative Maxillofacial Oncology Patients Without the Routine Use of an Intensive Care Unit

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Abstract

Aim To assess the safety and efficacy of immediate postoperative management of major maxillofacial oncology patients in a High Dependency Unit (HDU).

Patients and Methods All operated maxillofacial oncology patients were included. Detailed records and clinical parameters were assessed for diagnosis, procedure, diagnosis, American Society of Anaesthesiologists (ASA) grade, procedure, type of reconstruction, duration of surgery, post operative location, days of hospitalization risk factors and complications if any.

Results All the patients were placed in a HDU care for 48 h for closed monitoring and thereafter were shifted to the head and neck general ward. Only 7/117 (6%) patients required ICU admission because of development of systemic complications. Of our cases, 108/117 made an uneventful recovery (92.3%) with no serious complications. We noted a correlation between the incidence of perioperative complications and risk factors of ASA status ($\chi^2 = 7.81$, $P = 0.005$). Majority of the patients (94%) were managed successfully in the HDU care in the post operative period. Survival of free flaps proved to be extremely reliable with a survival rate of 99.1% (1/15 failed).

Conclusions The routine use of a HDU care for 48 hours followed by shifting the patient to a maxillofacial head and neck general ward is more appropriate for management of post-operative maxillofacial oncology patients. This practice has helped in offering high quality, cost effective and

efficient services without having any adverse effect on the quality of care.

Keywords Head and neck oncology · Intensive care unit · High dependency unit · Post operative care · Free flap · Complications

Introduction

One of the main modalities of treatment in head and neck oncology is surgical excision of tumor, with reconstruction where appropriate. Oncology surgery in itself is complex, extensive, lengthy (often up to 8–10 h) and also involves alteration of the anatomy and physiology of the upper aerodigestive tract. The immediate post operative care of these patients is quiet challenging and is mainly concerned with management of compromised airway, monitoring of blood pressure and other vital signs. Free tissue transfer with micro vascular anastomosis also requires close monitoring for micro vascular failure. This need has led, in some centers, to the routine use of intensive care in the immediate post-operative period [1]. However, the potential disadvantages include increased interventions, hospital acquired infections, frequent cancellation of operations because of lack of beds in intensive care, and increased cost [2, 3].

In 1999 Godden et al. [2] showed that it is safe to care for such patients outside an intensive care unit (ICU), provided this is done in an appropriate environment and with adequately trained nursing staff. By using the High Dependency Unit (HDU) with appropriately trained staff, as well as trained maxillofacial residents, it is possible to carefully manage selected patients without the need for the ICU.

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The maxillofacial surgery department's management has proved to offer high quality, cost effective and efficient services without having any adverse effect on the quality of care. This was done by admitting the patients immediately to the HDU care for 48 h for closed monitoring and there after was shifted to the head and neck general ward for the rest of the post operative stay. This indeed has facilitated us to successfully manage and offer high quality guidelines for immediate post operative care for all maxillofacial oncology patients.

Aims and Objectives

This study was designed to assess the safety and efficacy of immediate postoperative management of major maxillofacial oncology patients in a high dependency unit (HDU).

Materials and Methods

The study undertook all maxillofacial oncology patients who were operated at, Department of Oral and Maxillofacial Surgery, Saveetha Dental College and Hospital between January 2005 and October 2009. Patients with clinically and histologically proven resectable maxillofacial tumours, who underwent surgical resection, neck dissection with or without reconstruction, with no history of previous ICU admission were included in the study. Basic data, diagnosis, American Society of Anaesthesiologists (ASA) grade, procedure, type of reconstruction, operating time, post operative location, days of hospitalization, and complications if any were all recorded and analysed.

Results

During the study period 117 patients underwent surgery for treatment of maxillofacial tumours that had fulfilled the criteria for inclusion. All the patients were placed in a HDU care for 48 h for closed monitoring and there after were shifted to the head and neck general ward. Only 7/117 (6%) patients required ICU admission because of development of systemic complications (Table 4). Majority of the patients (94%) were managed successfully in the HDU care in the post operative period. Table 1 gives the clinical details of patients included in the study.

The routine use of tracheostomy in head and neck oncology was not seen in our study, as 2/117 patients (1.7%) had planned temporary tracheostomies. Majority of the patients had tumours resected 116/117 (99.1%) and radical neck dissections were 68/85 (58.1%).

Table 2 shows the operations and reconstructions. A total of 63/117 patients (53.8%) had primary closure

Table 1 Compatibility groups

Compatibility groups	(n = 117)
Mean age (years)	48.7
Range	16–88
Mean ASA grade	
I	42 (35.9)
II	61 (52.1)
III	14 (12.0)
Mean duration of operation (h)	7.45
Range	(4–12)
Median post operative stay (days)	25.18
Range	(1–50)
Mean duration of stay in ICU (h)	1.42
Range (days)	(1–3)

Table 2 Operations and reconstructions (n = 117)

Operations	%	Reconstructions	%
Tracheostomy	1.7*	Primary closure	53.8
Unilateral neck dissection	72.6	Distant pedicle flap	17.9
Radical neck dissection	58.1	Local flap	8.5
Supraomohyoid neck dissection	14.5	Free flap	8.5**
Bilateral neck dissection	0.9	Custom/AO reconstruction	16.2
Resection	99.1		

Pearson's chi-square test with Yates' continuity correction was used to calculate the * *P*-value = 0.008, ** *P*-value = 0.051

following tumour resection. Reconstructions were done using distant pedicle flap (17.9%), local flaps (8.5%), free flaps (8.5%) and AO/custom reconstruction (16.2%).

Flaps were closely monitored to detect any flap failure due to microvascular anastomosis. Flap infection (19.7%) was the most common local complication which was seen after the transfer to the head and neck general ward. The only other failure was a free fibula flap that underwent necrosis and failure in a previously operated patient, who had failure even after the placement of a regional flap due to wound dehiscence and infection (Table 3).

General systemic complications that were encountered are given in Table 3. Of our cases, 108/117 made an uneventful recovery (92.3%) with no serious complications. The commonest complication was acute renal failure 2/117 (1.7%) which could be attributed to the use of hypotensive anesthesia intraoperatively. Both patients died after 3 days of admission in the ICU.

All the patients were assessed preoperatively by a specialist anesthetic consultant and judged to be suitable for immediate return to the ward after 48 h of HDU admission.

Table 3 Local and general complications ($n = 117$)

Local complications	%	General complications	%**
Wound infection	4.3	None	92.3
Flap infection	19.7	Myocardial infarction	0.9
Flap necrosis	0.9	Pneumonia	0.9
No complication	75.1	Renal failure	1.7*
Arterial insufficiency	0	Sudden death	0.9
		Hypotension	0.9
		Atrial fibrillation	0.9

Pearson's Chi-square test was used to calculate the * P -value = 0.001, ** $P < 0.0001$

The standard protocol of retaining a flexometallic endotracheal tube for 24 h for oxygen administration and clearing tracheal secretions was advocated in the first 4–24 h in the HDU.

There were seven admissions to ICU, but only one patient went straight from the theater after the operation due to nil urine output. The other six were a result of late complications that would not have been prevented had the patient been admitted to ICU in the first place (Table 4).

The association between the ASA classification, presence of systemic complications and ICU admissions were noted in our study which can be used pre operatively to anticipate pre operatively the need for ICU admission. There was a correlation between the incidence of perioperative complications and risk factors of ASA status ($\chi^2 = 7.81$, $P = 0.005$). Free flap patients ($\chi^2 = 3.78$, $P = 0.05$) and prolonged duration of operation (two tailed t test, $P = 0.05$) may require ICU admission, but data showed that it is not of any prognostic value $P = 0.05$.

Out of six death (5.1%), one death occurred due to sudden cardio-respiratory arrest in HDU. The ASA grade, presence of systemic complication and mortality in our study indicated of the effect of poor physical status on the outcome.

Discussion

Traditionally, the post operative care of head and neck oncology patients involves an elective admission to an intensive care unit (ICU) to provide close cardiovascular

monitoring, ventilator support where indicated, and closed monitoring after free tissue transfer [4]. This has led to increasing financial constraints, cancellation of operations due to lack of ICU beds, and indiscriminate use of laboratory tests which may be unnecessary in predicting complication and affecting management [5]. Therefore the use of ICU has been questioned. However, the published literature on this subject is minimal [6].

In 1999 Godden et al., conducted a retrospective comparative review of two head and neck cancer units [2]. One unit sent the patients to a general ward with 'special care' for 48 h and the other sent the patients to ICU (without ventilation). The author established that there was no difference in morbidity and it was safe to manage post operative head and neck cancer patients without transferring them to an ICU. To et al. described in a series of 268 various head and neck cases that it is safe and cost effective to transfer most of these patients to a specialist ward [7].

Admission to intensive care unit for the first 24 h has become a routine practice among head and neck oncologist in a review conducted by Murray and Dempster [1]. This could be because of an increased accessibility to ICU facilities making it a more convenient option.

A review conducted by Bradley et al. and Whitaker et al.'s advocated that head and neck free flap patients do not require the routine use of ICU in the immediate post operative period [8, 22]. It was suggested that the use of a 'specialist care', high dependency unit (HDU) or ward is cost effective, without reducing the quality of care.

Routinely the endotracheal tube was retained for 24 h after the surgery in our case series. This proved to be an effective means of securing the airway, which carries low morbidity and avoids the drawbacks of tracheostomy [9]. No complications of tracheostomy were identified in the much smaller sample 2/117 patients (1.7%). Our study suggests that a short duration of securing endotracheal tube post operatively is a safe technique and provides access for bronchial suction and is well tolerated by patients.

Flap survival of 99.1% (1/15 failed) was achieved in our study when compared with Worcester hospitals 98% and Godden et al.'s 87% [2, 10]. Jeffery et al. in 400 patients gave a flap survival of 99.3% [11]. Chalian et al. in 156 patients showed 99.4% [12] and Disa et al. in 200 cases showed 98.6% [13]. Marsh et al.'s studies showed that

Table 4 : Admissions to intensive care (ICU)

	Case 61	Case 70	Case 71	Case 83	Case 94	Case 101	Case 102
Day of admission to ICU	1	2	1	1	2	1	2
Reason for admission	Myocardial infarction	Pulmonary odema	Renal failure	Sudden death	Hypotension	Atrial fibrillation	Renal failure
Duration of stay	3	2	3	3	2	2	3

head and neck free flap patients do not require the use of ICU in the immediate post operative period [14]. Free flaps proved to be extremely reliable with a 0.9% incidence of free flap failure which is similar to the study conducted by Jeffrey et al. (0.9%) [11]. Flap infections were managed by administration of appropriate antibiotics and wound debridement. The protocol of not using the ICU care in the immediate post operative period does not seem to have increased the flap failure rate and has not jeopardized the success after free tissue transfer [22].

The general complication encountered in our study may be seen after having undergone any major operations. During the study 108/117 (92.3%) recovered with no complications. Patients who developed general complications were transferred from the HDU to the intensive care for management. Most of the complications were managed successfully except for myocardial infarction (1/117), acute renal failure (2/117) and sudden death (1/117). Despite ICU admission, death occurred after 3 days indicating that this outcome could not have been prevented and did not depend on the post operative location of the patient.

There is little information available about the level of utilization of ICU by patients with head and neck cancer [2, 15]. Some centers admit all patients to an ICU after head and neck procedures [4]. Ryan and Hochman [16] could not find complications associated with early hospital discharge. Inversely to the expected, staying in an ICU for at least 3 days was encouraged for better monitoring of the patient's condition. In another retrospective study, 37 (1.5%) of 2346 patients undergoing head and neck surgery required admission to the ICU, since this was an extraordinarily easy access for patients requiring cardiopulmonary assistance or monitoring [15].

Admission to ICU has shown an increased incidence of MRSA infection [10]. The rates of MRSA infection was less in the HDU admission patients in comparison to the patients who were sent to the ICU and general head and neck ward in Worcester hospital [10]. This was because of relative isolation of the HDU patients in single side rooms for most of their postoperative stay and also because of the fact that they had not been previously admitted to ICU. In our case series we did not encounter MRSA infection. The local infection were found to be due to gram negative cocci and bacilli which were managed well with the administration of short courses of antibiotics in the perioperative period.

Analysis using the linear by linear association showed that ASA status ($P = 0.005$) was the only significant risk factor predictor for both perioperative medical and reconstructive complications. Jeffrey et al. study showed that the incidence of perioperative complication is related to perioperative comorbidity level as indicated by the ASA status [11]. Singh et al. noted a significant correlation between the comorbidity level index, age older than 70 years and

incidence of complication [17]. Haughay et al.'s study revealed age above 55 years had increased the incidence of major medical complication [18]. Shestak et al. [19] and Serletti et al. [20] reported ASA status was the only significant predictor of overall perioperative complications. There was a correlation between the incidence of perioperative complications and the ASA status as shown in Karina de Classia Braga Ribeiro et al.'s and Giuliano Molina de Melo et al.'s study [21, 23]. Thereby the ASA status can be used as a definitive indicator to determine the need for ICU admissions in head and neck oncology patients.

By the routine use of HDU, we can provide high quality care at low cost. This was achieved by using one-to-one nursing with the support of a qualified senior resident. The estimated total cost of the surgery and post operative stay was 15,000 rupees, while an ICU admission would cost 20,000 rupees per day. The advantage of using the HDU was that high of care could be provided at low cost to render the greatest benefit to the patients and families who would be spared the stress this may cause. The decision where immediate post operative care can be provided needs to be made locally, depending on staffing skill levels, resources and volume of workload.

Our study was not a randomized control study by a prospective study on all head and neck oncology patients who were admitted to HDU for the first 48 h post operatively for closed monitoring and were later on shifted to the head and neck general ward. The lack of published data still persists.

Conclusion

It is possible to manage patients safely in a high dependency unit with 'specialist care' for the first 48 h and thereafter shift them to the general ward after major head and neck oncology surgeries. This requires close consultant support, dedicated medical and nursing team and sufficient experience. This practice has helped in offering high quality, cost effective and efficient services without having any adverse effect on the quality of care.

Therefore the routine use of ICU is not needed for all maxillofacial oncology patients except for selected cases where perioperative complications are anticipated taking into consideration the risk factors. The lack of published data still persists.

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