



Pectoralis Major Myocutaneous Flap for Head and Neck Reconstruction: Ten Years of Experience

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Abstract

Introduction: When the only therapeutic possibility of head and neck cancer is a wide resection, reconstruction of the defect becomes as important as eradicating it. In 1979, Ariyan described the technique of Pectoralis Major Flap (PMF), redefining the myocutaneous reconstructions and today remains as versatile resource reconstruction, technically simple, with applications in the head and neck area. However, despite the flexibility of the technique, this kind of flap has a high complication rate, 17% to 63% of the flaps will fail.

Methods: A search in the database of the Department of Head and Neck at the National Cancer Institute of Mexico was made, from January 1, 2005 to December 31, 2015, it was used as primary inclusion criteria the use of pectoralis major flap as reconstructive option for primary form or salvage. It was reported the primary site of cancer, the treatment received at the beginning, the use of pectoralis major flap, the location of the defect, the administration of adjuvant radio therapy and the number of flaps per patient. Also, the complications were reviewed. Getting all the data, descriptive statistics were performed.

Results: Thirty patients were treated with pectoralis major flap reconstruction, of which 23 were men (76.6%) and 7 women (23.4%), the average age for men was 58.5 years (28 to 84) and women 58.4 years (29 to 83). Most primary tumors are located in oral cavity (53.3%) highlighting the primary site in alveolar ridge (30%). There were performed 17 salvage surgeries (53.3%), 11 primary surgeries (36.6%) and two procedures for osteoradionecrosis. Of the 38 flaps that were made, the most frequently described complication was a partial necrosis in 12 cases (31.5%) with a single case of total necrosis (2.6%). Minor complications included 12 cases of dehiscence (31.5%), 7 cases of bleeding (28.4%), and two immediate postoperative deaths not associated with pectoralis major flap.

Conclusion: Even in the days of assisted microscope surgery and free flaps, the pectoralis major flap remains in use because of the easy technique, obviating resources not available in all institutions with multiple applications for reconstruction of defects. The most frequent complication described in the use of this flap is fistula and dehiscence, which for our population were no difference; also we show the importance of the primary tumor site and a history of chemotherapy/radiotherapy as factors associated with the presence of complications.

Keywords: Pectoralis major flap; Head and neck reconstruction; Salvage surgery

Introduction

When the only possible therapy for treating head and neck cancer is an extensive resection, the reconstruction of the defect becomes as important as the eradication itself. Many attempts have been made to use the pectoralis major myocutaneous flap technique throughout history, with questionable success; it wasn't until 1979 that Ariyan [1,2] described this technique, redefining the concept of myocutaneous reconstructions. To this day, it remains a versatile resource, technically simple, applied to the reconstruction of the oral cavity, pharynx, esophagus and defects in soft parts. Even nowadays, with the rise of micro-vascular surgery and the use of free flaps, this technique is still considered a valid resource with similar success rates [3-5].

Despite the flexibility of the technique, this type of flap presents a high percentage of complications, 17% to 63% of flaps will fail [6-11]. Moreover, characteristics such as nutritional

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Table 1: Tumor distribution.

Site/Sub site of primary tumor	Number of cases	Percentage
Oral Cavity	(16)	53.3
Mobile tongue	5	
Gingiva	9	
Retromolar trigone	1	
Cheek tissue	1	
Oropharynx	(2)	6.6
Tonsils	1	
Base of the tongue	1	
Hypopharynx	(1)	3.3
Unspecified	1	
Larynx	(8)	26.6
Glottic	8	
Others	(3)	10
Pinna	1	
Neck skin	1	
Chin skin	1	
Total of cases	30	100

status, previous comorbidities, resection extension and previous radiation or chemotherapy or both constitute key factors for the success of the flap. When complications occur they become a great concern because most of the time a new surgical intervention is required to treat them; in such cases, it has been reported that 2.4% of the patients will experience total graft necrosis [12] or problems such as pharyngocutaneous fistula, dehiscence of surgical wound and bleeding, prolonging the hospital stay with marked increase in costs [6-14].

The purpose of this study is to present a report of our experience with the use of this type of flap in the reconstruction of patients with head and neck cancer, describing the associated complications, the target population, and the type of surgeries in which the procedure was used, as well as related comorbid factors and the success rate of the flap.

Materials and Methods

A search was carried out in the database of the National Cancer Institute of Mexico, with a date period from January 1st, 2005 to December 31st, 2015, of the surgeries performed by the Department of Head and Neck in every site, adding the inclusion criteria of the use of the pectoralis flap as the reconstructive option in primary treatments or salvage therapy for head and neck tumors.

The electronic files of each patient were reviewed and sorted by site and sub site of the primary tumor, based on the last revision of the AJCC 7th edition (American Joint Committee on Cancer) 2010 (Table 1).

Age, gender, indication of procedure, site of primary cancer, treatment received initially, location of the defect, complications presented, and number of flaps per patient were reported.

Furthermore, complications were classified and described as major (partial or total necrosis) and minor (greater supraclavicular volume, breast distortion, bleeding, dehiscence/fistula, closure complications at the donor site) according to guidelines established

by Chepeha et al. [10] (Tables 2-4).

Once the data was obtained, descriptive statistics of the variables were carried out via statistical analysis.

Results

From 2005 to 2015, 30 patients were treated with pectoralis flap reconstruction; out of these, 23 were men (76.6%) and 7 were women (23.4%), mean age was 58.5 years old (range 28 to 84) for men and 58.4 years old (range 29 to 83) for women.

Most of the primary tumors were located in the oral cavity (53.3%), the gingiva standing out as the main location (30%), followed by the mobile tongue (16.6%). The second site with primary tumors was the larynx (26.6%), where the glottis tumor prevailed. Three patients were treated for skin carcinomas that required extensive resections followed by reconstructions with the pectoralis flap, one at the pinna, the second at the skin of the neck, and the third presented a tumor on the skin of the chin.

With respect to stages, 13 patients were T4 (43.3%), 7 patients were T3 (23.3%) and only 4 (13.3%) patients were classified T2. In addition, two relapsing patients initially treated outside the institute were assisted and received a radical treatment. 4 patients had not been staged initially.

The types of surgeries performed were 16 salvage surgeries (42%), 11 primary surgeries (36.6%) and two procedures with the purpose of treating osteoradionecrosis (6.6%), there was a case of cervicofacial flap loss and a micro-vascular flap loss in a female patient who required several surgeries due to recurrence (No. 10). The number of flaps required by each patient to complete their recovery was 1.2, garnering a 73.3% success rate.

Out of the 38 flaps performed, the most frequently described complication was partial necrosis in 12 cases (31.5%), with just one case of total necrosis (2.6%); minor complications were 12 cases of dehiscence (31.5%), 7 cases of bleeding (28.4%), and two immediate postoperative deaths not associated with the flap.

A total of 16 patients (53.3%) were treated initially with chemotherapy and/or radiation therapy and 14 (46.6%) patients were treated initially with surgery, while a total of 23 patients received adjuvant chemotherapy (76%).

Discussion

Our study population does not show any differences with respect to what has been reported in literature, as the mean age of our male patients was 58.5 years old and 58.4 for female patients, just as the data reported by Vartanian et al. [12], where the mean age was 56 years old.

Most of the primary tumors of our study were located at the oral cavity (53.3%), not differing from existing reports, because as Milenovic et al. [6] observed, it accounted for up to 77% of the cases in its group of 506 patients. However, that study does not specify if the gingiva condition was the most frequently affected sub site, as it only mentions these tumors as intraoral. In our group we identified the gingiva as primary location site (30%), followed by the mobile tongue (16.6%), which we did not find in most of the publications.

The second most frequent primary tumor site was the larynx/hypopharynx with 30%, out of which 77.7% (7 patients) received salvage surgeries, entailing an increased risk of complications due to

Table 2: Characteristics of the patients.

No.	Gender	Age	Indication	Localization	Previous Treatment	Complications	#Flaps / patient
1.	M	68	Salvage surgery	Oral cavity/Tongue	Chemotherapy Radiotherapy	Partial necrosis/Dehiscence	2
2.	M	28	Cervicofacial flap loss	Pinna	-	No	2
3.	M	53	Salvage surgery	Larynx	Chemotherapy Radiotherapy	Partial necrosis	1
4.	F	44	Salvage surgery	Oral cavity/Left gingiva	Chemotherapy Radiotherapy	Bleeding Partial necrosis	1
5.	M	69	Salvage surgery	Larynx	Chemotherapy Radiotherapy	Dehiscence/Necrosis/Bleeding	1
6.	M	64	Salvage surgery	Pharyngolaryngeal	Chemotherapy Radiotherapy	Deceased	1
7.	M	55	Salvage surgery	Oral cavity/gingiva	Chemotherapy Radiotherapy	Breast distortion	1
8.	M	50	Salvage surgery	Oral cavity/gingiva	Chemotherapy Radiotherapy	Dehiscence	1
9.	M	71	Salvage surgery	Larynx	Chemotherapy Radiotherapy	Partial necrosis/Dehiscence	2
10.	F	40	Salvage / Surgery of the primary	Oral cavity/right gingiva	-	Dehiscence	2
11.	M	72	Salvage surgery	Oropharynx/Base of tongue	-	No	1
12.	M	54	Surgery of the primary	Chin skin	-	Breast distortion	1
13.	M	72	Osteoradionecrosis	Oral cavity/Tongue	Chemotherapy Radiotherapy	Partial necrosis/Dehiscence	1
14.	M	39	Surgery of the primary	Oral cavity/Tongue	-	Partial necrosis	1
15.	M	57	Osteoradionecrosis	Oral cavity/Left gingiva	Chemotherapy Radiotherapy	Dehiscence	1
16.	M	52	Salvage surgery	Oral cavity/gingiva	-	Partial necrosis	1
17.	M	56	Surgery of the primary	Larynx	-	Dehiscence	2
18.	M	65	Surgery of the primary	Oral cavity gingiva	Chemotherapy	Bleeding	1
19.	F	83	Salvage surgery	Oropharynx/Tonsils	Radiotherapy	Necrosis/Bleeding/Dehiscence	1
20.	F	80	Surgery of the primary	Oral cavity/gingiva	-	Partial necrosis/Breast distortion	1
21.	M	58	Surgery of the primary	Oral cavity/Cheek tissue	-	Dehiscence/Bleeding/Donor-site closure	1
22.	F	47	Salvage surgery	Oral cavity/tongue	Chemotherapy Radiotherapy	-	2
23.	F	29	Surgery of the primary	Soft neck tissues	-	-	1
24.	M	77	Surgery of the primary	Larynx	-	Partial necrosis/Dehiscence/Bleeding	1
25.	M	34	Salvage surgery	Oral cavity/tongue	Chemotherapy Radiotherapy	-	1
26.	F	60	Surgery of the primary	Oral cavity/gingiva	-	Dehiscence/Necrosis	2
27.	M	57	Surgery of the primary	Larynx	-	Bleeding	1
28.	M	84	Salvage surgery	Larynx	Chemotherapy Radiotherapy	Supraclavicular volume/Deceased	1
29.	M	78	Salvage surgery	Larynx	Chemotherapy Radiotherapy	Deceased	2
30.	M	68	Surgery of the primary	Oral cavity/Retromolar trigone	-	Partial necrosis/Dehiscence	1

the morbidity of the procedure, as reported by Redaelli et al. [15], where fistula percentage was 16% related to the primary treatment and the patient conditions.

Just as in other series, we also have patients with primary tumors in skin as observed in the case of the pinna, the chin and the skin of the neck, where the versatility of this flap was evident, even though currently at our service most of these tumors are reconstructed with supraclavicular flaps, which result in a lower morbidity rate and usually give better esthetic results.

In our field, early diagnosis is scarce. The population usually arrives to the health services with advanced stages of cancer, sometimes having been treated wrongly or with an alternative therapy that delays diagnosis and treatment. This was observed by having thirteen patients T4 (43.3%), seven patients T3 (23.3%) and only 4 patients (13.3%) classified as T2. This was similar in other reported

Table 3: Flap complications (n=38).

Complications	(N)	(%)
Major		
Partial necrosis	12	31.5
Total necrosis	1	2.6
Minor		
Supraclavicular volume	1	2.6
Breast distortion	2	5.2
Bleeding	7	18.4
Dehiscence/Fistula	12	31.6
Donor-site closure	1	2.6

series, such as the one in Rudes et al. [4] and Vartanian et al. [12] with 65.4% and 60.9%, respectively, of locally advanced tumors.

Table 4: Previously reported complications in pectoralis major flaps.

Author	Number of Flaps	Complications (%)	Total necrosis (%)	Partial necrosis (%)	Fistula / Dehiscence (%)
Ossoff (1983)	95	35	1	4	5
Wilson (1984)	112	16	7	9	NA
Kroll (1990)	168	63	2.4	17	21
Shah (1990)	211	63	3	29	29
Ijsselstein (1996)	224	53	0	13	21
Mehta (1996)	220	40.5	2.7	11.8	12.7
Liu (2001)	224	34.8	4	11.1	7.8
Dedivitis (2002)	17	41.2	5.9	5.9	11.8
Vartanian (2004)	371	36.1	2.4	11.4	7.1
El-Marakby (2006)	25	60	7.7	11.5	46.2
Milenovic (2006)	506	33	1.9	10.2	5.5
McLean (2010)	139	18	0.8	NA	NA
Rudes (2012)	27	59.3	3.7	11.1	18.5
Present study	38	94	2.6	31.5	31.5

A background of initial treatment with chemotherapy/radiation therapy was observed in 20 of our patients (66.6%), in contrast to what was reported by Pinto et al. [13] in 2010 with 25.92%, McLean et al. [12] with 33% and Rudes et al. [4] with 40.7%. This could be due to a greater predilection for the systemic therapy complemented by radiation therapy in our health center. Nevertheless, this should lead us to reflect on the abuse of this type of treatment.

Even in these days, with microscope-assisted surgery and free flaps, the pectoralis flap remains a valid resource thanks to the ease of the technique, which makes it evident that some resources are not available in some institutions for the use of reconstructing multiple defects.

The first complication described in the use of this type of flap is the fistula and dehiscence, with an average of 16.9% with respect to reported frequency. Our study reported 31.5%; we think this is due to the fact that we have a high rate of salvage surgery and a chronically malnourished population [16-18].

Another complication described in a particular case of our patients was the volume of the flap used for the reconstruction of an extensive defect caused by skin cancer, despite the 50% decrease in volume due to the lack of innervations, some liposuction procedures were carried out until the ideal postoperative volume was obtained [6,19].

Over the years, complication rates in multiple studies have been declining with 63% in 1990 by Kroll [19] to reducing complications to 13% [2], by McLean et al. [12] with the help of a refined technique and new suture materials. In our study, the percentage of complications was 34.1%, of which we had a high percentage of partial necrosis (31.5%) and only one total necrosis. However, the evolution of the partial necrosis was satisfactory in all cases.

Regarding the technique performed in our institution, it has a 73.3% success rate, similar to the one reported in literature [3,8,10,20]; it is also the preferred option when a free flap has failed. The major complications, including two postoperative deaths, occurred due to reconstruction in a salvage surgery for laryngeal cancer. This was related to complications of the respective surgery and not to the flap used, as explained by Pinto et al. [13].

Conclusion

The versatility of the pectoralis flap allows its use in multiple situations from the primary reconstruction of an extensive defect to a salvage surgery in case of a free flap loss. In our institution, the current approach is to use this resource in case of a failed attempt of a primary reconstruction with free flaps.

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