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British Journal of Oral and Maxillofacial Surgery 56 (2018) 256–266

BRITISH Journal of Oral and Maxillofacial Surgery

www.bjoms.com

Review

Oral rehabilitation of patients after maxillectomy. A systematic review☆

D.M. dos Santos, F.P. de Caxias, S.B. Bitencourt, K.H. Turcio, A.A. Pesqueira, M.C. Goiato*

Department of Dental Materials and Prosthodontics and Oral Oncology Center, São Paulo State University (Unesp), School of Dentistry, Araçatuba, São Paulo, Brazil

Received 21 March 2017; accepted 5 March 2018
Available online 11 April 2018

Abstract

Patients who have maxillectomy can be rehabilitated with reconstructive surgery or obturator prostheses with or without osseointegratable implants. To identify studies on possible treatments in this group, we systematically searched the Scopus, Embase, PubMed/Medline, and Cochrane databases to collect data on patients' characteristics, radiotherapy, and results related to speech, swallowing, mastication or diet, chewing, aesthetics, and quality of life. Of the 1376 papers found, six were included, and one other was included after an additional search of references. A total of 252 patients were included, and of them, 86 had reconstructive surgery, 91 were treated with obturator prostheses, 39 had reconstructive surgery or obturator prostheses associated with implants, and 36 had reconstruction plus an obturator prosthesis. Data on radiotherapy were incomplete. There is a lack of consensus about the indication for rehabilitation, as the treatment must be based on the individual characteristics of each patient.

Keywords: Palatal obturators; Maxillofacial prosthesis; Reconstructive surgical procedures; Oral surgical procedures; Rehabilitation

Introduction

Maxillectomy can cause maxillary defects such as oronasal fistulas, loss of support of the cheek and lip, as well as aesthetic defects in the middle third of the face, and functional impairment of speech and swallowing.[1–4] Treatment includes reconstructive surgery or rehabilitation with an obturator prosthesis, and both can be associated with osseointegratable implants.

Reconstruction with grafts of autogenous tissue seems to be the patients' treatment of choice,[2,3,5–10] but this can be challenging[11] when defects are large, or when operations are done in conjunction with other treatments such as radiotherapy. Another option is to use obturator prostheses. These are made from diverse components, the vertical extension of which is the most important part, as it contributes to the efficiency of oronasal separation, retention and stability of the prosthesis, and results in a better quality of speech.[11]

Because of the wide range of treatments available, our objectives were to identify studies that are relevant to the treatment of patients after maxillectomy, to establish which treatments give the best functional and aesthetic results, and to show how radiotherapy can influence the outcome.

Methods

This systematic review was based on the Preferred Reporting Items for Systematic Reviews and Meta-analyses

☆ Work presented at the 6th Congress of Faculty of Dentistry of Araçatuba, UNESP. Araçatuba, São Paulo-Brazil. May 12th – 14th, 2016.

* Corresponding author at: Department of Dental Materials and Prosthodontics and Oral Oncology Center, Araçatuba Dental School, São Paulo State University – UNESP, Araçatuba, São Paulo, Brazil.
E-mail address: goiato@foa.unesp.br (M.C. Goiato).

https://doi.org/10.1016/j.bjoms.2018.03.001

Table 1
Search details.

Terms	Search details
Maxillectomy treatment AND surgical reconstruction	(maxillectomy[All Fields] AND ("therapy"[Subheading] OR "therapy"[All Fields] OR "treatment"[All Fields] OR "therapeutics"[MeSH Terms] OR "therapeutics"[All Fields])) AND ("reconstructive surgical procedures"[MeSH Terms] OR ("reconstructive"[All Fields] AND "surgical"[All Fields] AND "procedures"[All Fields]) OR "reconstructive surgical procedures"[All Fields] OR ("surgical"[All Fields] AND "reconstruction"[All Fields]) OR "surgical reconstruction"[All Fields])
Maxillectomy treatment AND prosthodontic rehabilitation	(maxillectomy[All Fields] AND ("therapy"[Subheading] OR "therapy"[All Fields] OR "treatment"[All Fields] OR "therapeutics"[MeSH Terms] OR "therapeutics"[All Fields])) AND (("prosthodontics"[MeSH Terms] OR "prosthodontics"[All Fields] OR "prosthodontic"[All Fields]) AND ("rehabilitation"[Subheading] OR "rehabilitation"[All Fields] OR "rehabilitation"[MeSH Terms]))
Maxillectomy AND obturator prosthesis	maxillectomy[All Fields] AND (obturator[All Fields] AND ("prosthesis implantation"[MeSH Terms] OR ("prosthesis"[All Fields] AND "implantation"[All Fields]) OR "prosthesis implantation"[All Fields] OR "prosthesis"[All Fields] OR "prostheses and implants"[MeSH Terms] OR ("prostheses"[All Fields] AND "implants"[All Fields]) OR "prostheses and implants"[All Fields]))

(PRISMA)[12] guidelines and used the methods recommended by the Cochrane Handbook for Systematic Reviews.[13] It was registered in the International Prospective Register of Systematic Reviews (PROSPERO) as CRD42015025375.

Search strategy

The search was conducted by two independent examiners (FPC and SBB), and in case of conflicts, the resolution was mediated by a third examiner (DMS) who was also the study advisor. We searched the PubMed/MEDLINE, Embase, Scopus, and Cochrane Library databases using the terms shown in Table 1, and excluded duplicated papers. After reading the titles and abstracts, we selected studies and read the full text. Those included were related to the rehabilitation of patients after maxillectomy whose defects were characterised only by oroantral communications. All studies published up to March 2017 were included.

We also searched for references encompassing all online issues of Head & Neck; the International Journal of Oral and Maxillofacial Surgery; Journal of Oral Rehabilitation; Journal of Prosthetic Dentistry; Plastic & Reconstructive Surgery; Journal of Oral and Maxillofacial Surgery; Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology; Journal of Cranio-Maxillo- Facial Surgery; Journal of Prosthodontic Research; and the British Journal of Oral and Maxillofacial Surgery, in which we found one article[14] that fulfilled the inclusion criteria. Table 2 shows the components of the PICO question (participants, intervention, comparisons, and outcomes). The principal question to be answered was: "Is there an optimal choice for rehabilitation of patients after maxillectomy?".

Table 2
Components of the PICO (participants, intervention, comparison, and outcome) question.

P (participants)	Patients with oral defects after maxillectomies
I (intervention)	Rehabilitation of patients
C (comparisons)	Different treatments for rehabilitation
O (outcomes)	Effects of oral rehabilitation after maxillectomy on speech, swallowing, mastication, and diet; aesthetics, quality of life, and influence of radiotherapy on the result of rehabilitation

Inclusion and exclusion criteria and study selection

Randomised clinical trials, and longitudinal and transversal studies, all in the English language, which reported the outcomes of reconstruction and use of obturator prostheses, were included. They reported patients with unilateral or bilateral maxillary defects, independent of the amount of resection. However, they could not involve the orbital floor or the eye socket, or both, since these would generate oroantral communications (Aramany classes I to VI,[15] Cordeiro classes II and III,[16] Brown classes I and II[17] and their horizontal variations ("a", "b", and "c"), and all Okay classes,[18] except variation "f", as this involves the inferior rim of the eye socket) (Table 3).

Studies of patients with congenital defects or those caused by trauma or non-neoplastic diseases, reviews, systematic reviews, and case reports, were excluded. Papers had to contain both surgical and prosthetic treatments with or without osseointegratable implants, and results had to include at least one of the following: complications, functional results, aesthetics, quality of life, and efficacy of treatment.

Table 3
Maxillectomy classifications.

Class	Aramany[15]	Cordeiro[16]	Brown[17]	Okay[18]
I	Resection is along the midline of the maxilla, the teeth are maintained on one side of the arch. This is the most common maxillary defect, and most patients fall into this category	Limited maxillectomy includes resection of one or two walls of the maxilla, excluding the palate	Maxillectomy with no oroantral fistula. Removal of alveolar bone does not result in an oronasal or oroantral fistula. Resections of defects in the ethmoidal and frontal sinus cavity, or removal of the lateral nasal wall would fit into this category. It includes the removal of palatal bone only, which inevitably results in an oronasal fistula, but leaves the tooth-bearing part of the maxilla intact	Defects that involve the hard palate but not the tooth-bearing alveolus categorised as Class Ia Defects that involve any portion of the maxillary alveolus and dentition posterior to the canines, or which involved the premaxilla are categorised as Class Ib. They involve a small portion of the dental arch; the anterior sextant and a unilateral posterior quadrant of teeth remain intact
II	Unilateral defect, retaining anterior teeth on the contralateral side. Recommended design is similar to that of a Class II Kennedy removable partial denture, in which indirect retention minimises the possibility of being dislodged under gravity. This approach is favoured more than the classic maxillectomy described in texts on head and neck surgery. Presurgical consultation with surgeons has modified their approach with the aim of preserving the dentition on the contralateral side. The central incisor and sometimes all the anterior teeth to the canine or premolar are saved	Subtotal maxillectomy includes resection of the maxillary arch, palate, anterior and lateral walls (lower five walls), with preservation of the orbital floor	Low maxillectomy. Includes alveolus and antral walls but not the orbital floor or rim	Defects that involve any portion of the tooth-bearing maxillary alveolus, but include only one canine, are categorised as Class II. The anterior margin of these defects is within the premaxilla. This class also includes anterior transverse palatectomy defects that involve less than one half of the palatal surface
III	Palatal defect is in the central portion of the hard palate and may involve part of the soft palate. The operation does not involve the remaining teeth. The design for these patients is simple, and retention, stabilisation, and reciprocation can be planned effectively	Total maxillectomy includes resection of all six walls of the maxilla IIIa: total maxillectomy with sparing of orbital contents IIIb: total maxillectomy with orbital exenteration	High maxillectomy includes the orbital floor with or without periorbita and with or without resection of the base of the skull	Defects that involve any portion of the tooth-bearing maxillary alveolus and include both canines, total palatectomy defects, and anterior transverse palatectomy that involve more than half of the palatal surface, are categorised as Class III. They leave little or no residual palate or dentition for the secure retention of an obturator, which leads to a poor prosthetic prognosis
IV	Defect crosses the midline and involves both sides of the maxilla. The few remaining teeth lie in a straight line, which may create a design problem similar to the unilateral design of conventional removable partial dentures	Defects (orbitomaxillectomy) include resection of the orbital contents and the upper five walls of the maxilla, with preservation of the palate	Radical maxillectomy plus orbital exenteration with or without resection of the anterior base of the skull	

V	Bilateral surgical defect lies posterior to the remaining abutment teeth. Labial stabilisation may be needed, and splinting of remaining abutments is advisable	–	–	–
VI	It is rare to have an acquired maxillary defect anterior to the remaining abutment teeth. It occurs mostly in trauma or in congenital defects rather than as a planned operation. Cross-arch stabilisation is achieved through a system of cross-arch bars, which will provide wide distribution of support and retention from separated abutment teeth	–	–	–
a	–	–	Resection of unilateral alveolar maxilla and hard palate. Less than or equal to resection of half the alveolus and hard palate, and does not cross the midline or involve the nasal septum	–
b	–	–	Resection of bilateral alveolar maxilla and hard palate. Includes smaller resection that crosses the midline of the alveolar bone, including the nasal septum	–
c	–	–	Removal of entire alveolar maxilla and hard palate	–
f	–	–	–	Defects that involve the inferior orbital rim
z	–	–	–	Defects that involve the body of the zygoma

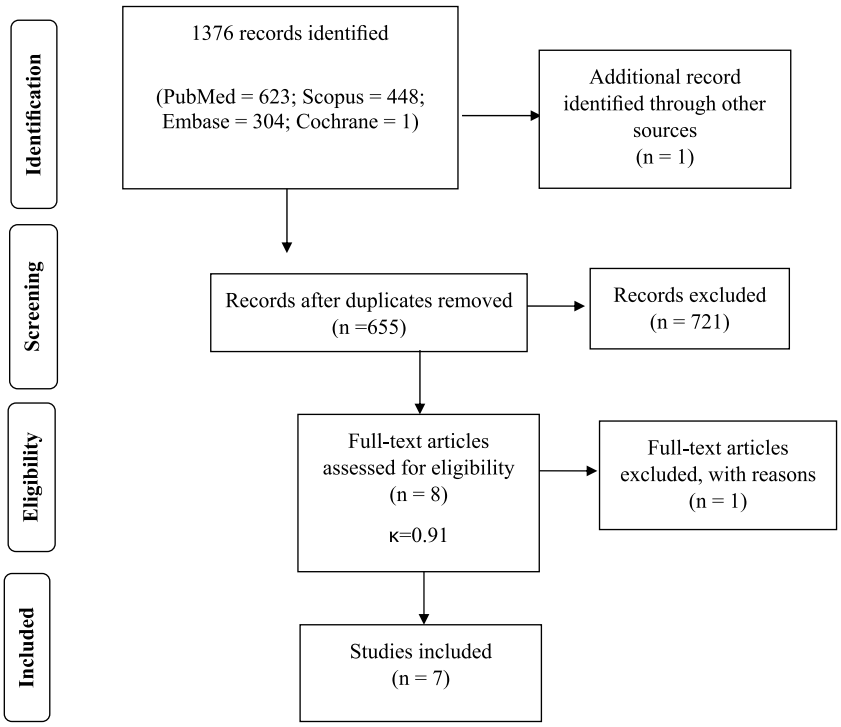

Fig. 1. Flow chart of systematic search and review process.

Evaluation of agreement and level of evidence

We used a weighted Cohen's kappa[19] test to evaluate the level of agreement between the examiners at two points: the first, shortly after the titles and abstracts had been read, and the second after the final selection had been made. The level of evidence of the studies included was based on National Health and Medical Research Council guidelines.[20] This classification system assigns levels of evidence (I, II, III-1, III-2, III-3, IV) according to the type of research, and assists in the classification of clinical studies with varying levels of evidence.[20]

Collection of data

We tabulated the data on a spreadsheet that contained the details of the patients, classification of the defects, postoperative results and complications, functional results, aesthetics, quality of life, and efficacy of treatment. We also collected data on the accompanying treatment of neoplasia with radiotherapy.

Results

Fig. 1 shows the selection of studies. We read the complete text of seven, excluded one[21] because the data were incomplete, and found one other[14] after an additional search of the references in all online issues. Five studies were retrospective,[7,9,10,22,23] one was prospective,[14] and one was a retrospective cohort study.[8] The level of evidence was III-3 for the prospective and retrospective studies, and III-2 for the retrospective review and cohort study.[20]

Qualitative analysis

Table 3 shows the classification of maxillary defects.

Of the 252 patients, 86 had reconstruction, 91 were treated with an obturator prosthesis, 39 had reconstruction or obturator prostheses associated with osseointegratable implants, and 36 had reconstruction and an obturator prosthesis. The mean ages ranged from 42.7 to 64 years, and patients had a maxillectomy for malignant or benign tumours. One study did not give the reason for the resections.[22]

Defects were reconstructed with rectus abdominis and latissimus dorsi myocutaneous flaps, temporalis flaps, iliac crest and fibular osteomuscular flaps, fibular osteomyocutaneous flaps, calvarial bone grafts, radial forearm fasciocutaneous free flaps; as well as anterolateral thigh, lateral arm, serratus composite, free rectus, iliac, and fibular free flaps. The classifications of the defects and their respective treatments are shown in Table 4.

Radiotherapy

Five studies[7,9,10,14,23] included patients who had had radiotherapy, and one of them[10] reported the presence of fistulas in some (Table 5). All but one of these studies[14] reported satisfactory results for speech, aesthetics, swallowing, chewing, and quality of life, independent of the approach used

Table 4
Details of the studies.

First author, year, and reference	Type of study and level of evidence	Mean (range) age (years)	No. of patients and sex	Indication for maxillectomy	Type of maxillectomy	Treatment
Bernhart 2003[7]	Retrospective analysis III-3	49 (7-83)	57 M:42 F:15	Malignant tumour	Classification by the authors: total maxillectomy, premaxilla resection, palatectomy, total bilateral maxillectomy, and total maxillectomy including contralateral premaxilla	Reconstructive surgery (n = 31) Reconstructive surgery with obturator prosthesis (n = 26)
Breeze 2016[14]	Prospective study III-3	64 NR	27 M:NR F:NR	Malignant tumour	Brown classes I and II	Reconstructive surgery (TF, RF, AT) (n = 14) Obturator prosthesis (n = 13)
Costa 2015[8]	Retrospective cohort review	50.4 (24-81)	22	Malignant tumour	Classification by authors: Class I (limited maxillectomy), Class II (subtotal or infrastructural maxillectomy)	Reconstructive surgery (McRA, McLD, OmIC, OmF, OmcF), calvary bone graft (n = 15)
	III-2		M:8 F:14			Reconstructive surgery and dental implant (n = 1) Obturator prosthesis (n = 6)
Elsherbiny 2008[9]	Retrospective review III-3	42.7 (41-55)	10 M:7 F:3	Malignant tumour	Subtotal maxillectomy	Reconstructive surgery (RF) and obturator prosthesis (n = 10)
Moreno 2009[10]	Retrospective analysis	54 (9-88)	59	Malignant and benign tumours	Brown Class II, Okay classes Ia, Ib, II, and III	Reconstructive surgery (AT, OmcF, McRA, RF, LA, SC, FR) (n = 10)
	III-3		M:NR F:NR			Obturator prosthesis (n = 49)
Rieger 2011[22]	Retrospective analysis III-3	52 (21-79)	39 M:20 F:19	NR	Okay classes Ib and II	Reconstructive surgery (FFF) (n = 16) Obturator prosthesis (n = 23)
Wang 2016[23]	Retrospective analysis III-3	50.9 NR	38 M:23 F:15	Malignant and benign tumours	Okay classes Ib, II, and III	Reconstructive surgery (FFF; IFF) + implant-supported fixed prosthesis (n = 20) Implant-supported obturator prosthesis (n = 18)

NR: not reported; TF: temporalis flap; RF: radial forearm fasciocutaneous free flap; AT: anterolateral thigh; McRA: myocutaneous rectus abdominis; McLD: myocutaneous latissimus dorsi; OmIC: osteomuscular iliac crest; OmF: osteomuscular fibula; OmcF: osteomyocutaneous fibula; LA: lateral arm; SC: serratus composite; FR: free rectus; FFF: fibular free flap; IFF: iliac free flap.

Table 5
Studies that reported radiotherapy associated with maxillectomy, and complications related to radiotherapy.

First author, year, and reference	Treatment	Follow up	Complications
Bernhart 2003[7]	Reconstruction (n = 31) Reconstruction + obturator prosthesis (n = 26)	37.5 months	NR
Elsherbiny 2008[9]	Reconstruction + obturator prosthesis (n = 10)	25 months	NR
Breeze 2016[14]	Reconstruction (n = 14) Obturator prosthesis (n = 13)	Mean (SD) 14 (4) months	NR
Moreno 2009[10]	Reconstruction (n = 10) Obturator prosthesis (n = 49)	At least 6 months	6 of 8 patients who developed nasocutaneous fistulas had had radiotherapy
Wang 2016[23]	Obturator prosthesis +implants (n = 18) Reconstruction + implants (n = 20)	NR	NR

NR: not reported.

(Table 6). Patients who had grafts of autogenous tissue had more complications including partial or total loss of the graft, oronatral fistulas, and necrosis (Table 6).

Discussion

The studies did not present a clear methodology or were not randomised or prepared as double-blind trials (levels of evidence: III-2 or III-3[20]).

Many classifications of the defects that result from maxillectomy have been described,[15–18] and a variety of operations are done to treat a wide range of neoplastic processes that involve diverse anatomical locations.[23] Although adjectives such as "limited", "partial", "medial", "subtotal", "total", "radical", and "extended" are normally added to define the extent of the operation,[24–27] the lack of a standard nomenclature can be confusing. As authors used established classifications, or had devised their own,[7,8] we did not consider the names of the classes used, but only the descriptions of each one. We designed Table 3 to show the classifications and descriptions of the principal authors clearly, and to identify the descriptions that met our inclusion criteria.

Primary closure of defects results in the best outcome and the least morbidity, but as this is not always possible, a graft may be necessary to close the wound, or an obturator prosthesis used.[7–10,28] The choice of approach depends on the extent of the defect and its location, the number of remaining teeth, and the quality and quantity of supporting tissue.[17,18] Reconstruction is the patients' treatment of choice, and could be associated with the greatest satisfaction.

Grafts such as the radial forearm flap[17] and the fibular free flap[22] are indicated for small defects, and vascularised cranial bone grafts with remnants of the temporal region or galeopericranial flaps can also be used.[8] Ideally, whatever the extent of the defect, the reconstruction must be done after the initial wound has healed.[29] Sometimes it is necessary to replace the dentition lost during maxillectomy, as reported by Costa et al[8] and in this case the relation of the prosthesis to the implant is crucial to maintain the position of the prosthesis.

Reconstruction with autogenous grafts, however, is not always the option of choice.[30] Surgeons may choose not to close the defect (particularly in patients with malignant tumours) to accommodate probable relapses, and dehiscence of the grafted tissue can result in the development of a fistula,[9] necrosis,[8] or even a partial[7,10] or total loss[10] of the graft in those treated with radiotherapy.[10] In these cases obturator prostheses are a viable option.

An obturator prosthesis can be planned for temporary or definitive treatment,[7,31] or in conjunction with other operations,[7] and can aid healing[9] and help to eliminate problems related to speech and swallowing.[7] Patients with large defects have fewer teeth, less tissue to support the prosthesis, and a larger area that requires support.[18] In these cases, rehabilitation with an obturator prosthesis could be difficult because its vertical extension has to be large enough to cover the entire defect making it heavy, uncomfortable, and difficult to adapt to.[28] To minimise this problem, a retained implant obturator prosthesis could be indicated, as long as the quality and quantity of bone is adequate for fixation of the implants.[17] Only one study[23] reported this method, and further investigation is needed.

Five studies[7,9,10,14,23] reported the use of radiotherapy as an adjuvant treatment. Elsherbiny et al[9] did not report complications, but Moreno et al[10] reported that of the eight patients who developed nasocutaneous fistulas, six had had radiotherapy, which may have led to cellular necrosis or a reduced blood supply that complicated healing.[32] Other authors[4,10,33] also stated that outcomes in patients treated with radiotherapy seemed less favourable.

Maxillary resections can change the appearance and cause difficulties with speech and swallowing,[7–9,22] which can profoundly affect a patient's quality of life.[26,34] Speech, chewing, swallowing, aesthetics, and quality of life were the factors most commonly discussed.[7–10,22] With the exception of Bernhart et al[7] who thoroughly described their results, the other authors did not separate the results of different groups, which made analysis impossible. Although satisfactory results were reported for all treatments, these cannot be confirmed because they were all evaluated using different techniques.

Table 6
Measurements of speech, swallowing, mastication/diet, aesthetics, quality of life (QoL), and postoperative complications.

First author, year, and reference	Treatment	Measurements					Complications/final outcomes	Follow up
		Speech	Swallowing	Mastication/diet	Aesthetics	QoL		
Bernhart 2003[7]	Reconstruction (n = 31)	Reconstruction:	NR	Reconstruction:	Reconstruction:	NR	Partial loss of free flap. Obturator caused difficulty chewing solids, and lacked retention and also resulted in hypernasal speech, but most patients had satisfactory results.	Mean 37.5 months
	Reconstruction + obturator prosthesis (n = 26)	Normal (8) Limited (0) Poor (1) NR (22)		Full diet (12) Soft diet (9) PEG/pureed diet (3) NR (7)	Normal (5) Limited (0) Poor (2) NR (24)		Final outcome: prosthetic rehabilitation is better when it follows reconstruction	
		Reconstruction + obturator prosthesis: Normal (25) Hypernasal (1) Hyponasal (0)		Reconstruction + obturator prosthesis: Normal (20) Limited (0) Poor (6)	Reconstruction +obturator prosthesis: Normal (21) Limited (1) Poor (4)			
Breeze 2016[14]	Reconstruction (n = 14); Obturator prosthesis (n = 13)	Worse after treatment	Worse after treatment	Worse after treatment	Worse after treatment	No significant difference after treatment between flaps and obturators	NR	Mean (SD) 14 (4) months
*Costa 2015[8]	Reconstruction (n = 15) Reconstruction+ dental implants (n = 1)	All groups normal (35)	NR	Soft diet (18)	Patients' score:	NR	Total necrosis of flap. No problem with obturator or dental implants.	24 years' review
	Obturator prosthesis (n = 6)			Unrestricted diet (35)*	7.61 (range 5 −10); Surgeon's score 7.71 (range 4 −10) *		Final outcome: flaps are preferable for large defects	
Elsherbiny 2008[9]	Reconstruction + obturator prosthesis (n = 10)	All patients as good as before operation	All patients as good as before operation	NR	All patients as good as before operation	All patients as good as before operation	Small oronasal fistula, but all flaps successful. Oronasal fistula. One patient died of progression of local disease Final outcome: immediate reconstruction with flaps and later with dental obturator is reliable. Patients had no problem related to functional outcomes when obturator removed	25 months

Table 6 (*Continued*)

First author, year, and reference	Treatment	Measurements					Complications/final outcomes	Follow up
		Speech	Swallowing	Mastication/diet	Aesthetics	QoL		
*Moreno 2009[10]	Reconstruction (n = 10) Obturator prosthesis (n = 49)	Reconstruction: Excellent (19) Good (16) Average (3) Poor (2) Obturator prosthesis: Excellent (34); Good (25); Average (12); Poor (2)	NR	Reconstruction: Unrestricted (22) Soft (14) Liquid (2) NPO (2) Obturator prosthesis: Unrestricted (40) Soft (23) Liquid (8) NPO (2)	NR	NR	Total and partial loss of flap. More complications in free flap group. Final outcome: no significant difference between obturator and reconstruction, but free flap is preferable for large and anterior reconstructions, and results in fewer complications related to functional outcome.	At least 6 months
*Rieger 2011[22]	Reconstruction (n = 16) Obturator prosthesis	Reconstruction: Nasalance normal; VPO opening normal; Words intelligible (14) Sentences intelligibile (15) Obturator prosthesis: Nasalance normal VPO opening normal Words intelligible (21) Sentences intelligible (22)	NR	NR	Reconstruction: mean (range) attractiveness rating 6.75 (1-10) Obturator prosthesis: Mean (range) attractiveness rating 5.9 (1-10)	NR	No difference for aesthetics, significant difference for one speech measurement, but not clinically relevant. Final outcome: no difference between treatments	Reconstruction group: 2.2 months to 6.7 years after resection Obturator group: 5.4 months to 18 years after resection
Wang 2016[23]	Obturator prosthesis + dental implants (n = 18) Reconstruction + implants (n = 20)	No significant difference between groups, but slightly better for obturator group	No significant difference between groups, but slightly better for obturator group	No significant difference between groups, but slightly better for obturator group	No significant difference between groups	No significant difference between groups	3 implants failed	NR

PEG: gastrostomy tube feeding (+) positive results; NR: not reported; NPO: nothing prescribed orally; (*) results are mixed among different classifications of defects; VPO: velopharyngeal.

Complications such as necrosis,[8,29] partial loss of tissue,[7,10] and oronasal fistulas,[9,35,36] which are associated with reconstructive operations, tend to be more serious than those associated with obturator prostheses,[10] possibly because of the greater manipulation of tissue and longer operating time. No complications related to obturator prostheses were reported, which suggests that any damage was minor, and the problem could be corrected in the laboratory, avoiding the need for a second operation. Nevertheless, healing and postoperative modification of the bone could result in a poor fit, which could make the prosthesis uncomfortable and insecure, and the need for adaptation could involve a large number of medical appointments.

There was no consensus between the authors in relation to the presented theme, which is a limitation to this review. Some[8,10] reported better results in patients who had tissue grafts and in those who had large or anterior defects, but others[7,9] stated that obturator prostheses were more efficient when associated with reconstructive surgery. However, based on our findings, the treatment of choice will depend on each individual case, and the location and extent of the defect does not always correlate with the method of rehabilitation. According to Breeze et al[14] the use of an obturator prosthesis, particularly if retained with implants, is a viable option. Another limitation that hampers comparison is the lack of a standard for the reporting of outcomes. If these were reported separately, for example, the extent of the defect, classification, or type of rehabilitation, the results could be compared more accurately.

In conclusion, before deciding on the best treatment, surgeons must consider the size of the defect and the extent of resection of the hard and soft palates (if included). They must also consider whether patients have had radiotherapy, the morbidity after resection, and the psychological effect of maxillectomy.[9,10,14]

Conflict of interest

We have no conflicts of interest.

Ethics statement/confirmation of patients' permission

None required.

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