

Patient Outcomes After Osseous vs. Soft Tissue Posterior Mandibular Reconstruction: A Systematic Review and Meta-Analysis

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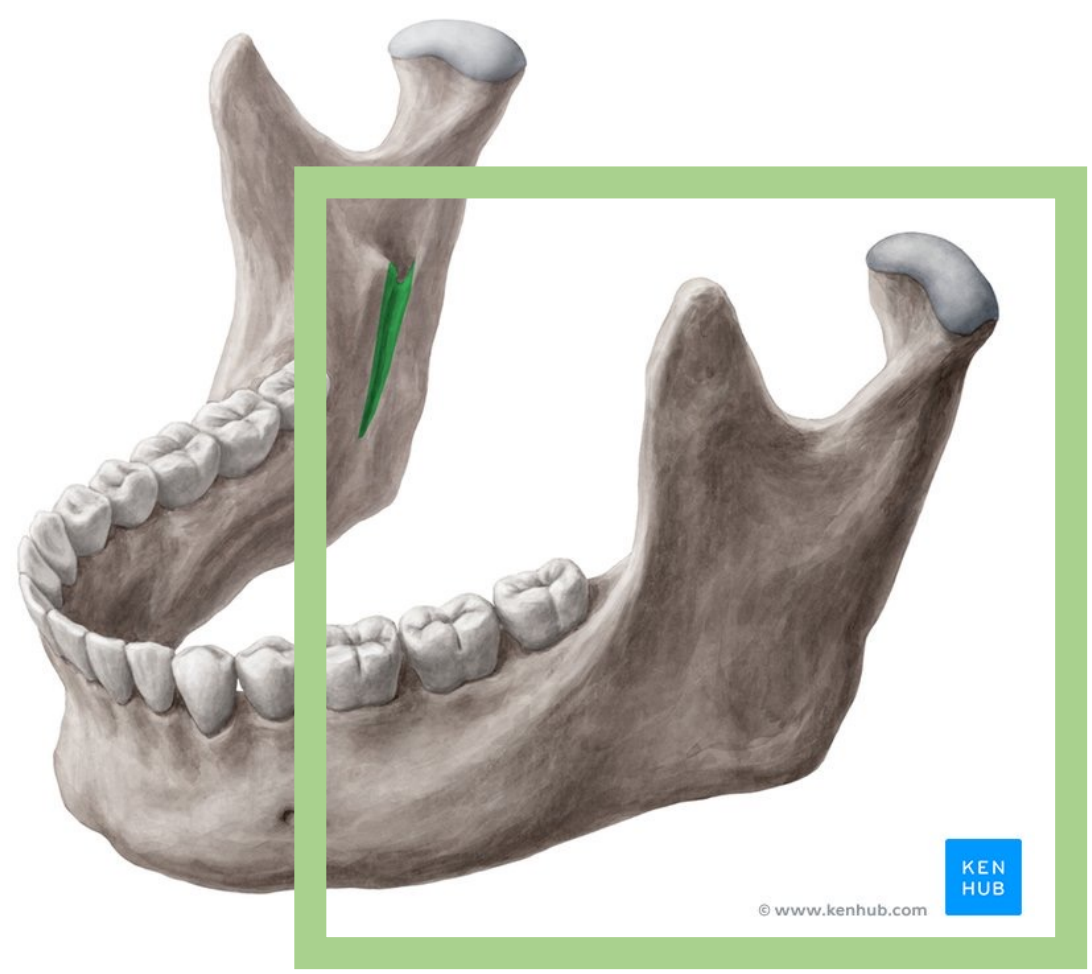
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INTRODUCTION

Posterior Mandible

- From the **mandibular angle** to the **condyle**, including the temporomandibular joint (TMJ)



Importance of the Posterior Mandible Reconstruction

- Masticatory function
- Temporomandibular joint (TMJ) function
- Dental occlusion
- Facial aesthetic and symmetry
- Mandibular continuity
- Upper airway patency

Common Causes of Total or Partial Mandibulectomy

- Malignant tumors**
Squamous cell carcinoma of the oral cavity (most frequent)
- Aggressive or recurrent benign tumors**
Ameloblastoma, Aggressive odontogenic cysts
- Osteoradionecrosis**
(most frequent non-tumoral indication)
- Severe and refractory osteomyelitis**
- Trauma**
- Secondary to reconstruction**
(infected or displaced material)

Posterior Mandible Reconstruction Techniques

Osseous Flap

Soft Tissue Flap

Advantages

- Gold standard**
 - Restores bony continuity
 - Supports mastication and dental implants
 - Long-term functional stability
 - Better occlusion and mandibular alignment
- Faster, less invasive surgery
 - Less morbidity at the donor site
 - Option for frail or palliative patients

Disadvantages

- Longer, more invasive surgery
 - Higher donor site morbidity (fibula, iliac crest, scapula)
 - Requires microsurgical expertise
 - Longer hospital stay and recovery
- Does not restore bony continuity
 - Limited support for mastication and dental rehabilitation
 - Less stable long-term outcomes
 - Less optimal occlusion and alignment

RATIONAL

- The **gold standard** for mandibular reconstruction is the **osseous flap**, while soft tissue flaps are rarely described for posterior mandible defects.
- Although osseous flaps provide better masticatory function, they are **associated with greater morbidity and surgical complexity**.
- In select patients who are **older, frail, comorbid, or edentulous**, soft tissue flaps may represent a **less invasive reconstruction technique**.

OBJECTIVES

- Compare the **functional** and **aesthetic** outcomes of all patients in the current literature who underwent **posterior mandibular reconstruction** using either **osseous** or **soft tissue flaps**.

RESULTS

Table 1: Demographic characteristics of patients and studies included in the systematic review

	Osseous flaps	Soft tissue flaps
Number of studies	82	17
Number of patients	1203	821
Mean age (years) [Range]	47,5 [22, 74]	56,0 [46, 64]
Length of hospital stay (days)	8,4	10,6
Patients with history of various cancers	88	27

Table 3. Complications after reconstruction with osseous or soft tissue flaps

Postoperative complications of reconstruction		Osseous flaps	Soft tissue flaps
Total complications	Total	195	36
Major complications	Death Myocardial infarction	11 (5,6%) 1 (0,5%)	4 (11,1%) 0
Minor complications	Hemorrhage Hematoma Dehiscence Wound infection/abscess Fistula Facial hypoesthesia Osteoradionecrosis Partial flap loss Total flap loss	4 (2,1%) 6 (3,1 %) 27 (13,8%) 49 (25,1%) 25 (12,8%) 39 (20,0%) 15 (7,7%) 3 (1,5%) 15 (8,0%)	3 (8,3%) 1 (2,8%) 8 (22,2%) 9 (25,0%) 5 (13,9%) 0 4 (11,1%) 1 (2,8%) 1 (2,8%)

Table 4. Aesthetic and functional outcomes after mandibular reconstruction with osseous or soft tissue flaps

Long-term outcomes	Osseous flap reconstruction Prevalence proportion (95% CI)	Soft tissue flap reconstruction Prevalence proportion (95% CI)
Patient-reported satisfactory aesthetic appearance	0,89 (0,79 - 0,99)	NA
Trismus	0,00 (0,00 - 0,02)	NA
Malocclusion	0,13 (0,01 - 0,25)	0,11 (0,00 - 0,42)
Return to normal diet	0,76 (0,57 - 0,94)	NA

METHODS

Protocol registered on PROSPERO
(CRD420250611142)

Systematic review conducted according to the PRISMA protocol

Figure 1. PRISMA flow diagram of the article selection process

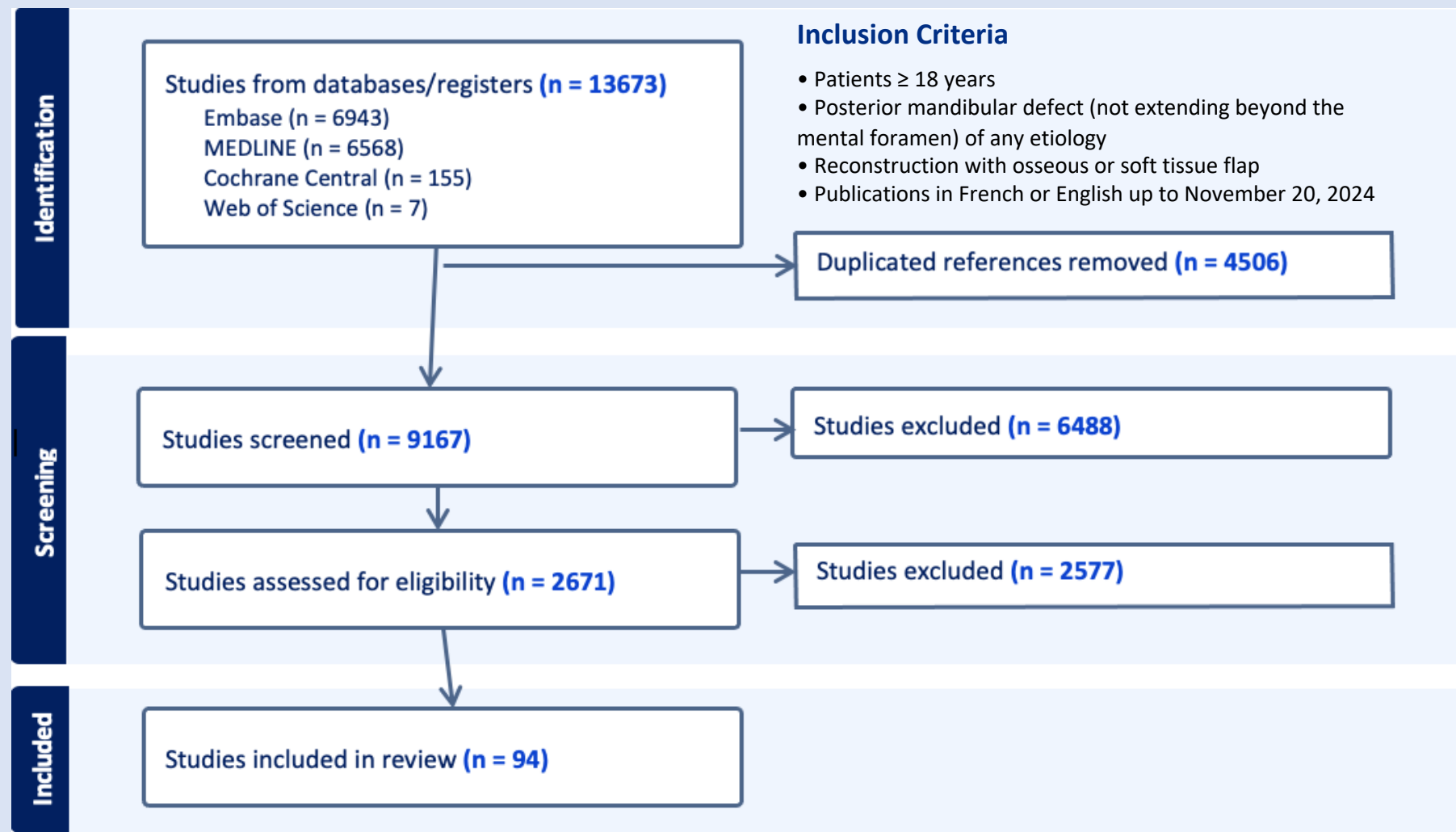


Table 2: Most frequently used flap types

Types of osseous flaps	Types of soft tissue flaps
•Fibula : 414 (37%) •Iliac crest/Ilium: 396 (23%) •Scapula : 115 •Costochondral : 93 •Ramus : 24 •Coronoid-ramus : 21 •Radius : 28 •Clavicle : 11 •Tibia : 5 •Humerus : 4 •Temporoparietal osteofascial flap: 3	•Anterolateral thigh (ALT): 368 (52%) •Pectoralis major: 222 (31%) •Rectus abdominis: 57 •Radial forearm without bone: 26 •Scapular without bone: 14 •Buccal fat pad : 10 •Sublingual gland flap: 6
Total: 1114	Total: 703

Interpretations

- Both techniques carry notable risks.
- Osseous flaps:** more infections, sensory deficits, and long-term morbidity.
- Soft tissue flaps:** higher relative risk of wound dehiscence and mortality, but based on very limited data.
- Sample size imbalance makes direct comparison cautious.

Interpretations

- Osseous reconstruction:**
 - Good aesthetic and functional outcomes
 - Few cases of trismus
 - Majority of patients return to a normal diet

- Soft tissue reconstruction:**
 - Too little data
 - Malocclusion outcomes appear comparable but remain uncertain due to small sample sizes

DISCUSSION

Our Experience at CHUM

With edentulous and older patients



Surprising results regarding:

- No dependence on gastrostomy**
- Return to a normal long-term diet**
- Good postoperative quality of life**

Indications for Alternative Reconstruction with Soft Tissue Flaps

- Frail patient / severe comorbidities
- Advanced age
- Palliative context
- Poor dental status or complete edentulism
- Prior radiotherapy
- Limited or non-load-bearing bone defects

Postoperative feeding

- Not enough homogeneous data in our review** to compare tube feeding dependence and progressive return to oral diet.
- Prolonged dependence on tube feeding should be considered an **indicator of functional morbidity** and reduced quality of life.

LIMITATIONS

- Heterogeneity of studies
- Variable quality of studies
- Limited comparison between the two types of reconstruction
- Few studies describing the presence/absence of gastrostomy after reconstruction

CONCLUSION

The largest systematic review on posterior mandibular reconstruction comparing osseous and soft tissue flaps.

- Limited comparisons** possible due to few studies on soft tissue flaps
- More studies needed on function and quality of life after soft tissue flap reconstruction**
- Surgical de-escalation** may be an option for selected patients

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Conflicts of interest:

None of the authors have a conflict of interest.



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