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Introduction

- Microvascular free flap reconstruction represents the most complex rung of the reconstructive ladder, offering reliable soft tissue and bony reconstruction for large or composite defects following head and neck tumor resection in the pediatric population.
- Despite high flap survival rates, postoperative complications remain a significant source of morbidity.
- Prior studies have focused predominantly on flap survival rather than the broader spectrum of complications, and have not consistently identified differences in complication rates between maxillary and mandibular reconstruction sites.
- Risk stratification by recipient site is essential for surgical planning and postoperative monitoring in young patients, yet pediatric-specific data remain limited.

Objective

- Aim 1:** To determine whether flap location is independently associated with overall postoperative complication risk in pediatric patients undergoing microvascular free flap reconstruction after head and neck tumor resection.
- Aim 2:** To characterize and compare the distribution of specific complication types between maxillary and mandibular reconstructions.

Methods

- Study Design:** Single-center, IRB-approved retrospective cohort study
- Data Source:** Tertiary pediatric hospital, 2007–2025
- Study Subjects:** Pediatric patients who underwent microvascular free flap reconstruction following head and neck tumor resection

	No complications (n=14)	Complications (n=21)	
	Mean, SD	Mean, SD	<i>p</i> -value
Age, years	11.6±4.60	12.16±5.29	0.385
	% (n)		
Male	85.71 (12)	42.86 (9)	0.016
History of radiation	23.08 (3)	42.86 (9)	0.282
<i>Histology</i>			0.141
Benign	25.00 (3)	50.00 (10)	
Sarcoma	75.00 (9)	40.00 (8)	
Carcinoma	0 (0)	10.00 (2)	
<i>Flap type</i>			0.384
Fibula	71.43 (10)	52.38 (11)	
Anterolateral thigh	14.29 (2)	33.33 (7)	
Others	14.29 (2)	14.29 (3)	
Flap composition			0.292
Osteocutaneous	71.43 (10)	47.62 (10)	
Fasciocutaneous	7.14 (1)	23.81 (5)	
Myocutaneous	21.43 (3)	28.57 (6)	
Tumor location			0.028
Mandible	92.86 (13)	7.14 (12)	
Maxilla	57.14 (1)	42.86 (9)	

- Primary outcome(s):** Postoperative flap complication requiring medical or surgical intervention
- Secondary outcome(s):** Distribution of specific complication types (wound dehiscence, hardware exposure, surgical site infection, flap necrosis, hematoma, venous/arterial thrombosis) stratified by flap location

Results

- Total of 35 pediatric patients (mean age 12 years) included in the study
- Flap location distribution: 10 patients (29%) maxillary reconstruction; 25 patients (71%) mandibular reconstruction
- Overall complication rate: 21 patients (60%) experienced at least one postoperative flap complication
- Maxillary reconstructions had significantly higher odds of complication compared to mandibular flaps (OR 9.75, 95% CI 1.07–88.87, p = 0.043)
- Wound dehiscence was more commonly observed in maxillary reconstructions
- Exposed hardware was more frequently associated with mandibular flaps
- No statistically significant difference in overall distribution of complication types between flap locations

Conclusions

- Maxillary reconstructions are associated with significantly higher postoperative complication rates compared to mandibular reconstructions in pediatric free-flap surgery
- Recipient site anatomy plays a critical role in determining surgical outcomes and complication risk
- Maxillary reconstructions present unique technical and postoperative management challenges in the pediatric population
- Tailored surgical strategies specific to maxillary reconstruction are needed to optimize outcomes
- Closer postoperative monitoring and surveillance protocols should be implemented for maxillary cases to mitigate complication risk in young patients