

Introduction: While a large body of literature exists regarding normative measurements for the craniofacial skeleton, few have analyzed the necessary dimensions that are pertinent in reconstruction using microvascular free flaps, such as the free fibula flap, following massive trauma or extensive oncologic resection.

Methods: Multiple maxillary and mandibular measurements were made from three-dimensional computed tomography (CT) scans belonging to 70 patients undergoing microvascular free flap reconstruction for head and neck defects. Relevant dimensions of the fibula were also obtained from a subset of 20 patients who had undergone CT angiography of the leg. Measurements from any portion of the scans involved in a pathologic process were excluded from the data.

Results: The mean usable fibula length was $237.0 \pm 20.5\text{mm}$ sufficient for reconstruction of total maxillectomy defects (mean: $132.4 \pm 10.1\text{mm}$), hemimandibulectomy defects (mean: $127.6 \pm 15.0\text{mm}$), or defects spanning from mandible angle to angle (mean: $162.2 \pm 19.4\text{mm}$) (Figures 1 and 2). The width of the lateral surface of the fibula at its midpoint (mean: $17.8 \pm 3.7\text{mm}$) was significantly less than the anterior mandible height (mean $32.3 \pm 5.6\text{mm}$), but similar to premaxillary height (mean $20.4 \pm 4.7\text{mm}$) and mandible body height (mean $24.9 \pm 4.8\text{mm}$), arguing against the practice of using a “double-barreled” fibula for lateral mandibular defects. Mean measurements for the anterior mandibular curvature, mid-body curvature, and the angle of the mandible were $124.4^\circ \pm 5.8^\circ$, $174.0^\circ \pm 4.0^\circ$, and $122.8^\circ \pm 8.4^\circ$, respectively. Because the mid-body curvature approximates 180° , an argument can be made that a mid-body osteotomy may not be necessary to restore mandibular shape.

The premaxillary width and length, as well as the mandibular symphyseal width, anterior body length, posterior body length, condyle and ramus height were all significantly greater in males than females. Anterior and mid-body mandibular height was significantly greater in patients with full dentition compared to edentulous patients.

Conclusions: When normal craniofacial anatomy is unavailable in the setting of massive trauma, or destructive and/or exophytic tumor involvement, normative dimensions may be a helpful guide for free flap design and should be in the armamentarium of any surgeon engaged in complex microvascular head and neck reconstruction.

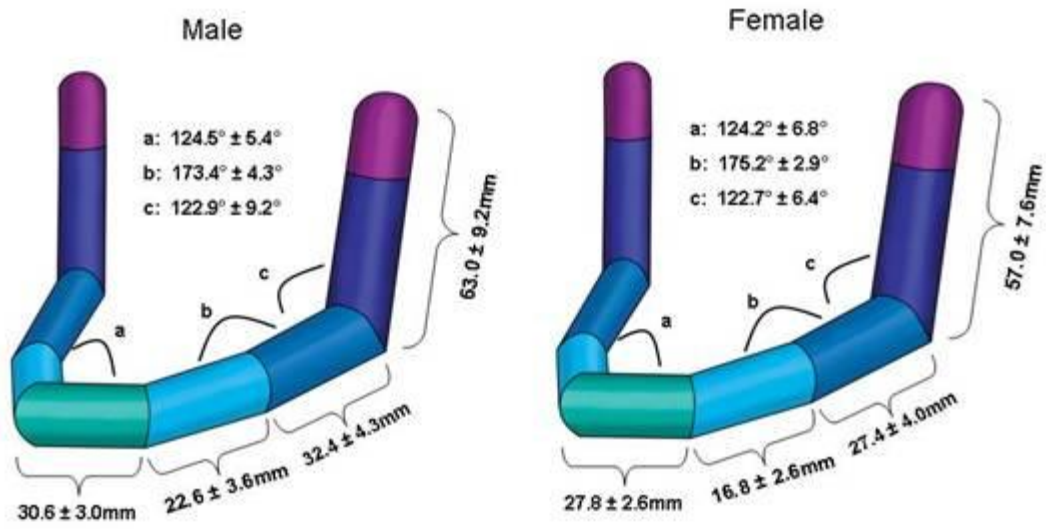


Figure1:

Figure 2:

