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**Case Report**

# The deep circumflex iliac artery flap for central arch mandibular reconstruction in a patient of peripheral vascular disease: a case report

**Sukanya Naskar[1], Subhabrata Ghosh[1], Rajdeep Guha[1], Arnab Adak[2]*, Anannya Tripathy[1]**

[1]Department of Head and Neck Surgical Oncology, Chittaranjan National Cancer Institute, Kolkata, West Bengal, India
[2]Department of Surgical Oncology, Chittaranjan National Cancer Institute, Kolkata, West Bengal, India

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***Correspondence:**
Dr. Arnab Adak,
E-mail: arnabadak89.aa@gmail.com



## ABSTRACT

Carcinoma of oral cavity requires resection followed by reconstruction. For the carcinoma of alveolus, lower gingivo-buccal sulcus or gingivo-lingual sulcus of middle 3rd bony reconstruction is required. Generally free fibula flap is preferred. But free fibula cannot be harvested if there is peripheral vascular disease. Here we present a case of carcinoma alveolus of mandible middle 3rd in a case of peripheral vascular disease. Deep circumflex illiac artery used instead of free fibula flap. Patient had a very good outcome, facial cosmesis was good, no hernia in the donor site.

**Keywords:** Deep circumflex iliac artery flap, Central arch, Mandibulectomy, Peripheral vascular disease

## INTRODUCTION

Carcinoma of lower alveolus of middle third of mandible or any oral lesion with bony involvement of the middle third of mandible requires adequate bony reconstruction. Free fibula flap is the most commonly used flap for reconstruction of this defect.[1] Free fibula flap is contraindicated in case of peripheral vascular diseases or patients with arteria peronea magna. In this case we dealt with a patient with a patient of carcinoma lower alveolus middle third with peripheral vascular disease. We performed oncological resection with reconstruction with deep circumflex illiac artery based osteo-myo-cutaneous flap maintaining the arch of the mandible.

## CASE REPORT

A 59-year male, known hypertensive with past history of smoking presented with ulceroproliferative growth in lower alveolus middle third for 2 months. On examination patient had a ulceroproliferative lesion of 5×4 cm mass approximately extending to the lingual surface up to floor of the mouth and left canine to right canine laterally, gingivobiccal surface free. Clinically no neck nodes palpable.

Magnetic resonance imaging (MRI) face and neck revealed a heterogeneously soft tissue mass of size 6.8×4.2×3.9 cm in the anterior part of floor of mouth and sub-lingual region causing erosion of mandible and loss of fat plane with floor of the mouth (Figure 1). Few subcentimetric nodes in neck on imaging. Staging work up was done.

Patient was planned for surgery and initial plan was wide local excision arch mandibulectomy with bilateral neck dissection followed by reconstruction. Initial plan of reconstruction was free fibula flap. Computed tomography (CT) angiography was done before final planning. It revealed narrowing in left posterior and anterior tibial artery, left arteria dorsalis pedis (Figure 2). Plan of free fibula flap was abandoned. Deep circumflex illiac artery based free flap was planned as an alternative free flap. It supplies illiac crest, contains muscle and was the ideal replacement of free fibula flap.

**Figure 1: Heterogenously soft tissue mass of size 6.8×4.2×3.9 cm in the anterior part of floor of mouth and sub-lingual region causing erosion of mandible and loss of fat plane with floor of the mouth.**

**Figure 2: Narrowing in left posterior and anterior tibial artery, left arteria dorsalis pedis.**

***Flap harvesting***

Skin incision made 3 cm above the lilac crest, parallel to the lilac crest. External oblique aponeurosis was divided (Figure 3a) Internal oblique and transversus abdominis muscle fibres divided to expose surgical peritoneum (Figure 3b). External iliac artery traced reflecting the peritoneum (Figure 3c). Deep circumflex illiac artery and vein traced identified. Iliac crest bone cut with 6 cm segment (Figure 3d). Bone with vessel and some fibres of transversus abdominis harvested. Deep circumflex iliac artery and vein divided at origin at the time of reconstruction.

***Donor site closure***

The defect was covered with mesh (Figure 4). Mesh was fixed to fascia over anterior superior illiac spine anteriorly and fascia attached to posterior superior iliac spine posteriorly. Mesh was opposed to remnant muscle fibers of internal oblique and tranversus abdominis.

Floor is formed by fascia transversalis and peritoneum which was kept intact while harvesting flap. Mesh was covered with external oblique muscle and aponeurosis.

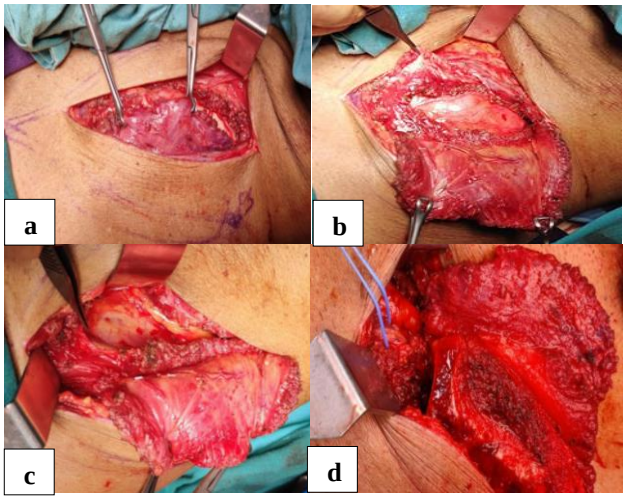


**Figure 3: (a) External oblique aponeurosis was divided, (b) internal oblique and transversus abdominis muscle fibres divided to expose surgical peritoneum, (c) external iliac artery traced, and (d) iliac crest bone cut with 6 cm segment.**

**Figure 4: The defect was covered with mesh.**

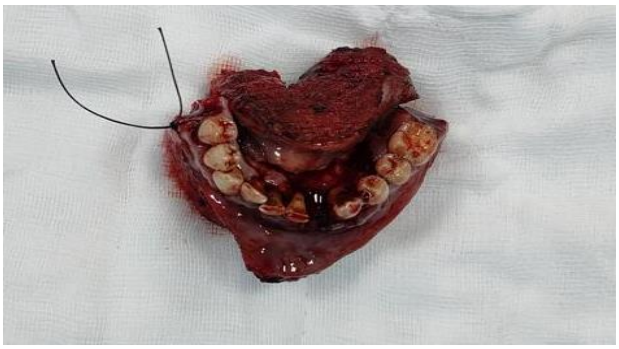

**Figure 5: Wide local excision with arch mandibulectomy containing growth with adequate margin.**

***Surgery of primary tumor***

Bilateral neck dissection was done preserving facial artery and vein on both side. Wide local excision of the tumor with arch mandibulectomy was done.

***Bony reconstruction***

Iliac crest was used to cover the bony defect, fixed with screws and plates on both sides (Figure 6). The concave side is placed inside to maintain the arch. Muscle was used to cover the floor of the mouth defect. After bone fixation floor of the mouth was covered with muscle. Skin closed to cover the bone and soft tissue (Figure 7).

**Figure 6: Iliac crest was used to cover the bony defect, fixed with screws and plates on both sides.**

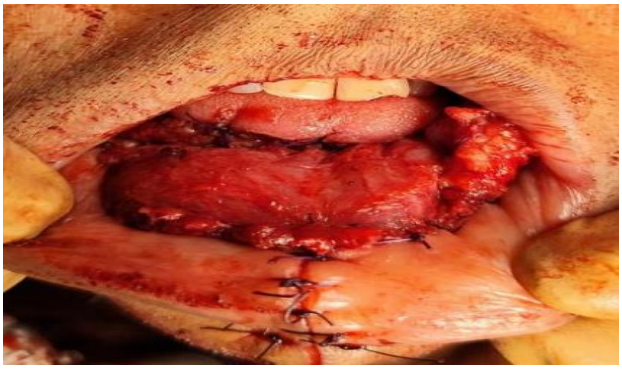

**Figure 7: Appearance after skin closure immediate post-operative period.**

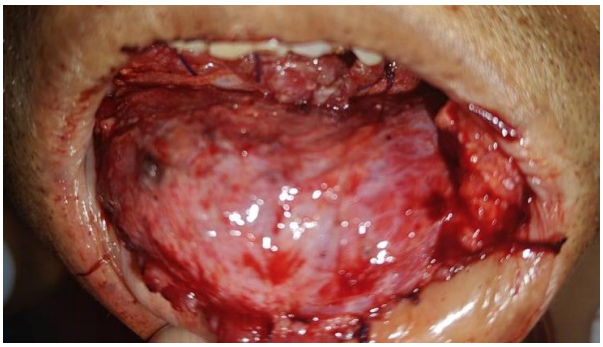

**Figure 8: Flap condition at 7th post-operative day, early epithelization started over the muscle.**

***Follow up***

Follow up was done at regular intervals. At 7th post-operative day oedema was persisting. Muscle was still exposed and early epithelisation started (Figure 8). Jaw was protruded anteriorly because of edema. Epithelisation was complete by 6 weeks (Figure 9a). Jaw protrusion normalised as oedema subsided completely at 6 weeks (Figure 9b).

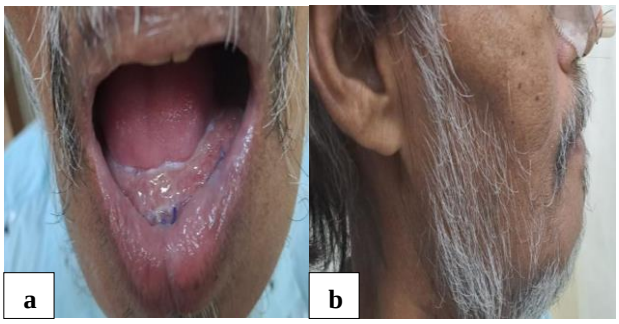


**Figure 9: (a) Epithelization was complete by 6 weeks, and (b) jaw protrusion normalized as oedema subsided completely at 6 weeks.**

## DISCUSSION

The mandible plays an important role in maintaining facial appearance and function. The deciding milestones in mandibular reconstruction is not only the bony continuity, but also restoring its near normal contours with appropriate bone height and width, providing adequate framework for superficial soft tissue structures, preserving the tongue mobility and its bulk and proper inter-arch relation, and re-establishing jaw functions.[1,2]

Various methods for the reconstruction have been documented depending on its location and extent, ranging from use of robust plating systems, vascularized and non-vascularized bone grafts. The use of latter two groups is preferred over the use of reconstruction plates and screw system as it includes risks of plate fracture, exposure and infection. Non vascularized autologous bone grafts present with resorption and graft uptake risks which can be countered by improving the cellular activity and capillary ingrowth by introducing hyperbaric oxygen therapy (HBO).[3]

Vascularized free bone grafts have become the standard of care for mandible reconstruction. With higher flap survival rates, good functionality and aesthetics are achievable. Mandibular reconstruction has improved significantly with various free flap options. However, few studies are there in literature to compare them.[1,2] The fibula is the most preferred flap in mandibular reconstruction among the plastic surgeons and head and neck surgeons. Iliac flap is not so much popular, mentioned in a few papers.[4]

Free fibula is considered a work-horse for mandibular reconstruction, receiving the blood supply from endosteal and periosteal branches of the peroneal artery. The bone provides up to 25 cm length and ease of two-team approach.[5] The supply of bicortical bone is capable of reconstruction of defects across the midline, eligible for the placement of dental implants and little morbidity of the

donor site. Under certain circumstances, the free fibular flap becomes a contraindication for bone reconstruction. Patients with peripheral vascular disease involving the lower extremities, hypoplastic anterior tibial artery and patients with opposite lower extremity amputation are a few mentionable in the category. Sometimes availability of a small skin pedicle also makes this a difficult choice of flap.[6]

The deep circumflex iliac artery based free flap was first described by experimental, followed by clinical works of 11 osteocutaneous free flaps by Taylor et al in 1979.[7] Advantages mentioned by him includes good vessel caliber and length, its potential to be shaped for mandibular defects, availability of skin, muscle and fascia and minimal donor site morbidity.[7,8] For a further requirement of pedicle length, placing the iliac crest osteotomy more posteriorly, may prove to be significant. The facial vessels can also be dissected above angle of the mandible or the external carotid artery can be accessed within the parotid substance in the posterior aspect of the mandible to compensate for pedicle length if needed. Less scaring is encountered in DCIA patients with no need of skin graft as compared to FFF patients.

Cariati et al in his comparative analysis of two institutions conclude that neither the patients' BMI nor early ambulation posed as a risk of abdominal hernia.[9] They also state that the use of mesh is not an absolute necessity in closing the defect after harvesting the flap if closure could be done in a tension free manner. They reported 6% patients with post-operative permanent gait changes and chronic pain.[9]

Schardt et al in 2017, compared the post-operative pain, orthopedic complications and quality of life in a group of 27 patients treated with DCIA free flap and another 19 patients treated with FFF.[10] The disadvantages noticed in the former group included seroma, hematoma, herniation and more duration of wound drainage. The latter group 16 patients needed a healing by secondarily and one patient showed tendon exposure. The requirement of walking aid in DCIA patients were more common than the FFF patients. However, in total from a psychological aspect, patients treated with DCIA flap benefited more compared to the fibula donor site.[10] A 2018 systematic review compared the incidence of chronic pain in the DCIA population compared to the fibula donor site as 8.4 to 26% and 7 to 73% respectively.[11]

## CONCLUSION

Deep circumflex iliac artery based osteomyocutaneous flap is a suitable alternative of fibula osteocutaneous free flap for mandibular reconstruction specially in those patients who are not suitable candidate for free fibula flap due to anatomical anomaly and peripheral vascular compromise. Post-operative outcome and rehabilitation are excellent with minimum morbidity.

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