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Original Research Paper

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IS PECTORALIS MAJOR MYOCUTANEOUS FLAP POSSIBLE IN PRESENCE OF AN IPSILATERAL CHEST WALL IMPLANTED CARDIAC PACEMAKER?

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ABSTRACT

CONTEXT: Conventionally presence of cardiac pacemakers are assigned to be relative contrain dications of same sided PMMC (Pectoralis Major Myocutaneous) flap harvest due to presence of lead wires in the subcutaneous soft tissue planes, the difficulties encountered during dissection and post operative possible complications of the donor area. But under dire circumstances when the general and cardiac conditions of patients preclude all other means of higher forms of reconstruction we are left with no other choices.

AIMS: This study aimed at establishing if it was at all possible to perform a PMMC flap in the same side of chest wall with implanted cardiac pacemaker under dire circumstances with limited options and the patients presenting with co-morbidities which precluded options of free microvascular tissue transfer.

Settings and Design: Institutional retrospective observational non-randomised purposive study over 2 months.

METHODS AND MATERIAL: 2 PMMC flaps were done in presence of ipsilaterally placed cardiac pacemakers in 2 patients who were poor surgical candidates due to high cardiac risks after taking high risk consents and thorough counselling about the procedure details, risks and intensive post operative monitoring.

STATISTICAL ANALYSIS USED: Retrospective descriptive observational study.

RESULTS: Out of the 2 PMMC flaps for oro-mandibular malignancies in 2 cases with ipsilateral chest wall cardiac pacemakers there was successful flap viability in both cases and nil donor area complications and cardiac related issues.

CONCLUSIONS: Even in the presence of cardiac pacemaker PMMC flap may be harvested and used from the same side of chest wall in some patients with precautions when no other superior forms of reconstruction permit.

KEYWORDS : Cardiac Pacemaker, Pmmc (pectoralis Major Myocutaneous) Flap, Oromandibular Cancer.

INTRODUCTION-

PMMC flaps are still the workhorse flaps pedicled, single staged, loco-regional which are used to resurface defects of the oro-mandibular regions. [1,2,3,4,5,6] Mainly used to cover defects of the lateral segments of mandible in elderly individuals, they have indications in other defects of the tongue, gingivo buccal sulcus, retro-molar trigone etc. The design of flap is simple encompassing para-areolar area with different shapes of the skin paddle possible and the donor site primarily closed. The flap has robust blood supplies mainly from the pectoral branch of thoracoacromial artery and the lateral thoracic arteries. The pedicle generally lies along the line which runs from the middle of the clavicle to intersect at right angle a second line drawn by joining the acromion process tip and the xyphisternum. [7,8,9,10] The region of deltopectoral flap is spared generally and the harvested flap taken to the defect in head and neck through a subcutaneous tunnel in the neck.

Head and neck malignancies are frequently seen in patients with multiple comorbidities. The state of the art reconstruction is always free tissue transfer and microvascular anastomosis to the neck vessels. [11] But these patients often preclude long hours of surgery due to high cardiac risks. [12] Considering need of loco-regional tissue transfer for resurfacing the defects created after excision of the oro-mandibular mass, options remain limited. The PMMC has been conventionally stamped as a contraindication in presence of ipsilateral sided cardiac pacemaker. [1] The other options are Latissimus dorsi or Trapezius musculocutaneous flaps which possess the difficulties of reaching the defects, changes of position to lateral or prone intraoperatively and back to supine position, extended deltopectoral flaps which also are impossible feats in presence of cardiac pacemakers, the lateral forehead flaps which cause severe disfigurement of forehead skin grafted sites, other flaps like nasolabial, submental or infrahyoid which is relatively difficult and often not possible due to ipsilateral neck dissections being done. [13]

Implantation of permanent cardiac pacemaker is performed with the transvenous access, commonly via a percutaneous approach of the subclavian vein, the cephalic vein (cut-down technique), or rarely the axillary vein, the internal jugular vein or the femoral vein [14,15]. The most common transvenous route is the left or right subclavian vein. The vein is usually blindly punctured where the first rib and the clavicle are joined and a guide wire is advanced and placed on the right atrium or the vena caval area under fluoroscopy guidance. After the puncture, a small incision 3.8-5.1 cm is made in the infraclavicular area (many prefer to give incision first before the puncture). A sheath and a dilator are advanced, and when sheath reaches the right place the guide wire and the dilator are removed. A second guide wire is positioned, if necessary,

via the second puncture or by a double-wire technique in which two guide wires are inserted through the first sheath. The pacemaker lead is inserted into the sheath and advanced under fluoroscopy to the appropriate heart chamber, where it is attached to the endocardium either passively with tines or actively via screw-in leads. The lead is sewn with a nonabsorbable suture to the underlying tissue and afterwards, the generator is placed to a subcutaneous pocket and connected to the lead. Lastly, the incision is closed with absorbable sutures.[14]

As the pulse generator and the leads of the pacemaker remain in the subcutaneous pocket in the lateral third of the antero-superior chest wall, the important challenge in harvesting the PMMC flap is to avoid injury to the leads and pulse generator.

METHODOLOGY-

This is a retrospective descriptive institutional non-randomised purposive study conducted by the departments of Plastic Surgery, Surgical Oncology and Cardiology in Nove mber, 2019 to December, 2019 at Apollo Gleneagles Hospital, Kolkata. This study aimed at establishing if it was at all possible to perform a PMMC flap in the same side of chest wall with implanted cardiac pacemaker under dire circumstances with limited options and the patients presenting with co-morbidities which precluded options of free microvascular tissue transfer. 2 patients with cardiac pacemakers and oral malignancies present on the same side of the implanted pacemaker in whom no options of free tissue microsurgical transfer was possible were included. Informed consents and special risk consents were taken, explaining the procedure details, the risks related to flap and pacemaker related. They were investigated as a part of pre-anesthetic and cardiological check up, planned and operated upon by two teams of surgeons from Plastic Surgery and Surgical Oncology.

The pacemaker was put into asynchronous VOO mode, with no use of Monopolar cautery. [16,17] Working in the supero-lateral area where the pacemaker has been implanted with the lead wires being directed inside the subclavian vein during the PMMC flap harvesting and tunneling posed a significant challenge with the risk of the implants and wires being disturbed in the soft tissue plane in our cases. The initial inferior and medial part of the flap harvest was conventional, but as we approached the lateral and superior margin of incisions, the dissection was done under magnification using utmost precautions and minimum use of cautery. Only the point bleeders were cauterized with bipolar cautery, the muscle in the lateral and medial borders was transected after visualizing the thoraco-acromial pedicle with Ligasure. (Figure 2A) The subcutaneous tunnel over the clavicular region (through which the flap and its pedicle was passed into the site of the defect was made by incorporating the whole of the overlying soft tissue bulk in which the pacemaker was palpated constantly in a plane so as to expose the bare muscle. The lateral thoracic vessels supplying the muscle were ligated and divided. After the necessary dissection, the muscle was gently folded on itself while passing it inside the tunnel and retrieved into the defect area without any tension. (Figure 2B) Again the position of the pacemaker palpated and the donor area defect carefully closed in 2 layers- internal layer with 2-0 Vicryl and external skin with 3-0 Nylon after meticulous haemostasis and placement of 1 suction drain. (Figure 2C) The rest of the steps of flap inset and closure of the cervical incisions were conventional. (Figure 3A)

Post-operatively the patients were monitored in ICU set up with ECG monitoring, ABG analysis and a 2D ECHO being done after 48 hours. The suction drain was kept strictly for 5 days post-operatively and the daily output quantity and nature were assessed. Donor site dressings were daily changed with inspection of the suture lines. The suction drain was removed on 6th post-operative day in both the cases when the serous output was less than 20 ml. The complete blood count, temperature chart and assessment of unnatural pain and discomfort in the donor area were done on daily basis to rule out any infection and the patient being administered broad spectrum antibiotics against Gram positive, Gram negative and anaerobic microorganisms for 7 days post-operatively. Sutures on the donor site were removed after 2 weeks.

RESULTS-

In this retrospective study, 2 patients were operated on with cardiac pacemakers situated on the same side of the chest wall. The mean duration of the surgeries was 3.5 hours. Both flaps survived (100% survival rate). There were no major complications related to the flap, as well as the donor sites. Minor complication of wound dehiscence requiring secondary suturing of the flap area was encountered in 1 case and marginal flap necrosis requiring re-inset of flap in another case. The flaps were healthy at 1 month follow up at OPD. Average hospitalisation was 12 days. The pacemaker modes were reset to previous modes before discharge. There were no pacemaker related issues.

Table- 1 – showing the details of the patients, pathology and complications.

S. No.	Age(years)	Gender	Pathology	Flap survival	Complications
1	78	Male	Right sided oro mandibular CA with composite skin and lining defect after lateral segmental mandibulectomy	100%	Skin necrosis on chin requiring secondary suturing.
2	81	Male	Left sided mandibular CA with inner lining defect post hemimandibulectomy	90%	Marginal necrosis of anterior aspect of flap with re-inset done.

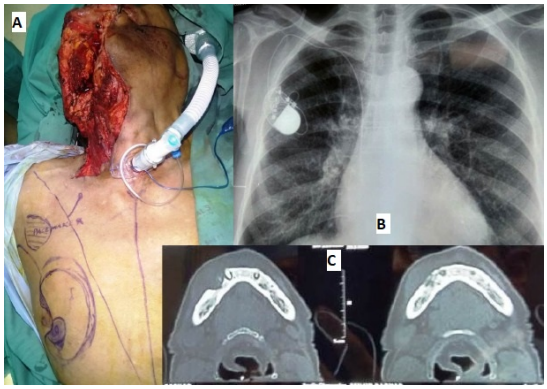

Figure 1- A. Showing the right sided oro-mandibular defect following excision of the primary tumour and neck dissection,

PMMC flap marked in standard way with 2 proposed skin paddles – outer cheek paddle O and inner mucosal paddle I by folding the flap, position of the cardiac pacemaker is marked by subcutaneous palpation; B. Showing the X-ray chest PA view with right sided position of cardiac pacemaker seen; C. CT scan slices to denote the position of tumour infiltrating and eroding the right lateral mandible.

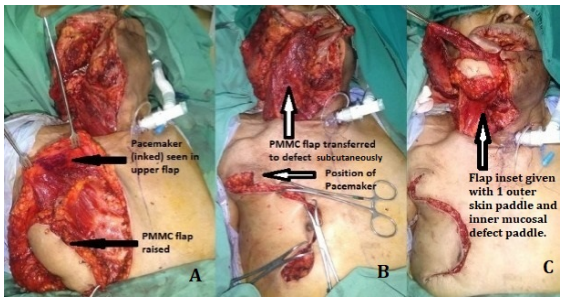

Figure 2- A. Showing the harvest of PMMC flap in presence of the cardiac pacemaker shown with the inked area in the upper skin flap undermined above the muscle plane; B. Showing the transfer of the PMMC skin paddle subcutaneously into the defect site and C. Showing the inset of the flap by making 2 skin paddles separate with de-epithelising and resurfacing the outer cheek full thickness defect with the distal part of the flap and the inner oro-mandibular mucosal defect with the more proximal part of the flap.

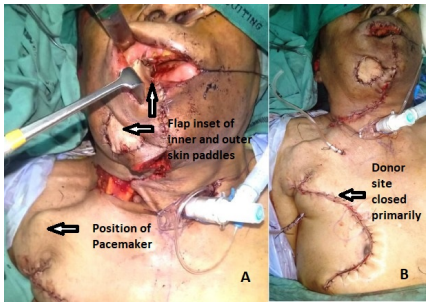

Figure 3- A. Showing the flap after complete inset of inner and outer skin paddles. B. Showing primary closure of the defect area in layers with the position of the pacemaker in the subcutaneous tissue plane.

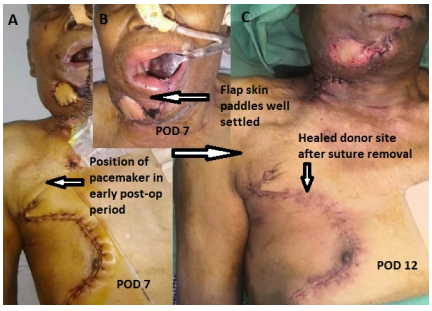

Figure 4- A. and B showing postoperatively the donor area and the flap outer and inner skin paddles at POD 7; C. Showing the donor area and flap at POD 12.

DISCUSSION-

Patients with oral malignancy require reconstruction after tumor extirpation in the form of lining, bony support and the external cheek defects if any as immediate procedures. [11] Though free microvascular tissue transfer has become the state of the art procedure in recent times, often patients with lateral oro-mandibular defects have to be reconstructed by the conventional pedicled flaps like PMMC owning to co-morbidities. [13] Implanted cardiac pacemaker is such a chall enge in such patients who precludes long hours of surgery and per-operative morbidities. [16,17]

As per literature we did not come across any reported case of this reconstruction with PMMC flap for oral malignancy recons truction in presence of cardiac pacemaker to the ipsilateral side of malignancy. Rather PMMC flaps are described as contraindications in presence of cardiac pacemakers. [1]

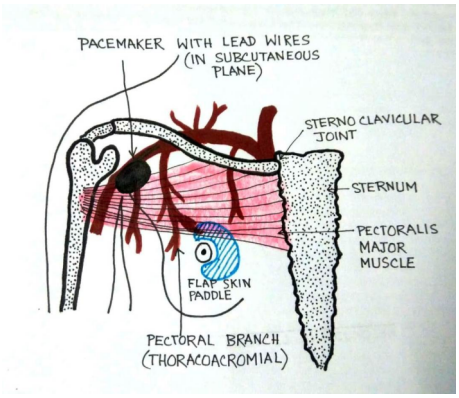

Fig. 5 – showing the pictorial form of the regional anatomy, the position of cardiac pacemaker and the area of flap harvest.

SPECIAL CONSIDERATIONS PER-OPERATIVELY-

1. Pre-operative skiagram of chest to note the exact position of the implant and assessing the region of harvesting with clinical correlation.
2. No use of monopolar cautery. Monopolar diathermy as per literature has been described as a contraindication in presence of pacemaker even in the asynchronous mode within vicinity of the device. [16,17]
3. Change in pacemaker mode to asynchronous VOO mode. [17]
4. Use of ligasure and bipolar cautery. [17]
5. Special care during raising upper skin flap which contained the pacemaker in subcutaneous tissue plane so that the implant was not exposed and remaining covered with soft tissue and care during undermining and creating the subcutaneous tunnel for the passage of pedicled flap to the neck and ensuring no pressure on of the pedicle on the area of pacemaker.
6. Meticulous haemostasis to achieve a dry wound bed for minimising the risk of seroma, collection or infection in the donor site closure area.
7. Maintenance of suction drain in the donor area strictly for 5 post-operative days or the daily output less than 10 ml whichever was early.
8. Constant cardiological surveillance, routine ECG and Echocardiography monitoring[17]

The operative difficulties of tissue dissection were encou nte red due to limited and restricted use of monopolar elect roca utery even with the pacemaker mode changed. The region of the flap harvest posed challenges in the supero-lateral part of the dissection where the pectoral branch running underneath the muscle had to be visualised and the muscle transected on both the sides avoiding injury to the pedicle at the same time safeguarding the implanted pacemaker in the lateral subcutaneous plane. The regional anatomy is depicted in Fig. 5.

Postoperative care of the donor site is another important issue in the management. The chances of seroma, infection, wound dehiscence in the area of the donor site should under all means be minimised. Drain care should be maintained and the area dressed and cleaned on regular basis with occlusive dressing all the time. We did not encounter any complications

related to the donor site.

Out of 2 cases in one case there was marginal necrosis of the flap requiring debridement and secondary suturing and in the other case there was a minor wound dehiscence over the chin requiring secondary suturing as opposed to literature where there has been complications of flap necrosis and wound dehiscence in upto 60% cases.[5,6]

We have also observed that both the patients had their implants lateral to mid-clavicular line which made it easy and safe for the flap harvest and passage through the subcutaneous tunnel. We have not encountered any more medially placed pacemakers which might have posed difficulty. Our mean duration of the surgery was 3.5 hours as opposed to 80 min min as per a study. [6]

However the safety and efficacy of this procedure, in presence of implants like the pacemaker, has to be established by a large series study with follow ups. Also everywhere there is no versatile set up available for the simultaneous intervention of interventional cardiologists if needed. Hence, we suggest this procedure only in a large interdepartmental multidisciplinary set up with all available resources to tackle any untoward outcomes and complications.

Also if there had been any post-operative flap failure or other complications related to flap the only option left was to have a free microvascular tissue transfer secondarily even with the risks related to prolonged anaesthesia. Specifically these points were mentioned and explained to the patients and their attendants during consenting.

CONCLUSION-

Even in the presence of cardiac pacemaker PMMC flap may be harvested and used from the same side of chest wall in some patients with precautions when no other superior forms of reconstruction permit.

CONFLICT OF INTEREST: None.

SOURCE OF FUNDING: None.

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