DONOR SITE COMPLICATIONS AFTER HARVESTING BONE GRAFT FROM THE ANTERIOR ILIAC CREST IN ORAL AND MAXILLOFACIAL SURGERY

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SUMMARY.
This prospective study of a donor site complications after harvesting bone grafts from the anterior iliac crest, 40 consecutive autogenous iliac crest bone grafts were performed by maxillofacial surgeons in the maxillofacial unit, 10th floor Specialized Surgeries hospital. Complications had been divided into two groups major, which include (Deep infection, extensive hematoma, pain lasting longer than 2 months, sensory loss more than 2 months, subluxation, gait disturbance, herniations of the abdominal content, iliac wing fracture and vascular injury) and minor, which include (superficial infection, minor wound dehiscence, temporary sensory loss and transient pain less than 2 months). In this study 3 types of approaches had been used superior- lateral approach, superior-medial approach and lateral approach. All patients were followed up for months by regular out patient visit every week following their discharge from the hospital. Nine patients represent (22.5%) of the total cases had donor site complications of (33.3%) major and (66%) minor, 2 patients (5%) had deep infection, 1 patients (2.5%) had extensive hematoma, 2 patients (5%) had temporary sensory loss, 1 patient (2.5%) had superficial infection, 1 patient (2.5%) had wound dehiscence and 2 patients (5%) had transient donor site pain. Harvesting of iliac crest bone grafts might be associated with certain complications, however adequate preoperative planning and proper surgical technique, required to reduce the incidence of these complications.

Introduction:
In 1682 Van Meerken transplanted canine skull bone to a calvarial defect with reported success. The surgeon was forced to remove the graft, however, or face excommunication from the church. As time passed, bone grafting became more widely
practiced on the basis of the empiric success of the procedure\(^1\). Bone graft is a procedure used to reconstruct persistent bone defects. Such, defect after tumor resection, bone cysts, infection, trauma, congenital malformation and osteotomy\(^2\). Harvesting of autogenous bone grafts is a common orthopaedic procedure for a long time. The iliac crest is the most common donor site because of easy access, low morbidity and availability of large quantities of both cortical and cancellous bone\(^3\). Cortical bone is used mostly for fixation, while cancellous bone grafts are needed for osteogenesis\(^4\). Technique of harvesting, the nature of the patient population and the amount of bone graft harvested all differ greatly between orthopaedic and maxillofacial surgery (MFS)\(^5\). There has been a limited study of iliac crest bone graft morbidity in the oral and maxillofacial surgical procedures. Although often regarded as the simple or routine part of bone graft requiring surgery. Some authors have suggested that the iliac crest donor site produces an unacceptably high degree of postoperative morbidity such as nerve, arterial, or urethral injury; chronic donor-site pain; cosmetic deformity, herniation of abdominal contents; pelvic fractures; gait disturbances; hematoma; infection; peritoneal perforation; and hip subluxation most of these complications are avoidable when the surgeon is aware of their possibility and is familiar with the involved anatomy and preferred surgical approaches\(^6,7\).

**MATERIALS AND METHODS:**
In this prospective study, 40 consecutive autogenous iliac crest bone graft from the anterior iliac crest were performed by maxillo- facial surgeons in the maxillofacial unit, 10th floor, Specialized Surgeries hospital, Medical City, from the 1 October 2005 to 1 July 2007. On 40 patient there were 10 females and 30 males, their age was 11-37 year (mean 24.3 years). Candidate patients were only those presented with facial bones defect due to trauma, benign or malignant tumors and congenital malformations. Any patient presenting with one more of the following criteria was excluded: Patient with systemic disease that could possibly delay tissue healing (i.e diabetes). With previous surgery or injury to the ilium. Patient on drug therapy within past three months that could alter tissue healing (i.e systemic steroids, chemotherapy or immunosuppressants). For all patients included in the study, a standarized record frame was done. This protocol consist of four main sections, personal informations, preoperative, operative and post operative informations.

**Measurement and assessment of complications:**
In this study complications had divided in to two main groups. Major complications; Those that lengthened hospital stay, and required additional surgery or caused significant disability, which include, Deep infection, extensive hematoma, pain lasting longer than 2 months, sensory loss more than 2 months, unsightly scar, subluxation, gait disturbance, herniations of the abdominal contents, iliac wing fracture, vascular injury, deep venous thrombosis and peritoneal perforation. Minor complications: Those that responded to minimal treatment, and healed without treatment or did not cause any permanent disability, which include superficial infection, minor wound dehiscence, temporary sensory loss and transient pain less than 2 months. All patients evaluated intra and post operatively for signs and symptoms of donor site complications with aid of radiograph if needed for at least 2 months, the pain evaluated by numeric rating scale (NRS). (NRS) recorded once daily after the operation. NRS- represent the continuum of the patient opinion of the degree of pain. The patient rates the degree of pain by making a mark on the scale values.
The superior- lateral approach:
In which the dissection is done on both the superior and lateral aspects of the iliac crest. For this approach, the crest is fractured free, reflected medially and pedicled off its soft tissue attachments. The crest is then wired back into place after removal subcrestal bone for grafting.

The superior- medial approach:
In which the dissection is done on both the superior and medial aspects of the iliac crest. For this approach, the crest in fractured free, reflected laterally and pedicled off its soft tissue attachment. The crest is then wired back into place after removal of subcrestal bone for grafting.

The Lateral approach:
In which the soft tissue dissection is done lateral to the iliac crest and the graft is obtained by entry through the lateral cortical plate.

RESULTS:
In the study 2 patients (5%) had deep infection one of them need debridement under general anesthesia (GA) (Fig. 1). One patient (2.5%) had large hematoma need evacuation under GA. Two patients (5%) had temporary sensory loss of the iliohypogastric nerve and lateral femoral cutaneous nerve of the thigh, 1 patient (2.5%) had superficial infection. One patient (2.5%) had wound dehiscence. Two patients (5%) had transient donor site pain lasted less than 2 months (Table 1)
Fig. 1: Deep infection in the donor sits.
- Drainage of the wound.
- Persistent discharge.
- Debridement of the wound under general anesthesia and packed with Iodoform gauze.
- The wound completely healed.
### Discussion:

In our study design, complications were classified as minor and major. 2 patients (5%) had deep infection, both of them were readmitted to the hospital, one of them needed debridement of the wound under GA. Our treatment protocol for postoperative deep infection at maxillofacial unit, 10th floor, Specialized Sugeries hospital was incision, drainage, debridement, daily copious irrigation with normal saline solution, daily packing of the wound with iodoform gauze and a course of culture directed intravenous and oral antibiotics (in our study, cultures from two wounds were negative because patients on antibiotics). The infection results from improper technique, septic instruments, septic theater, the use of large pieces of bone wax, catgut suture rejection. Careful dissection, hemostasis, layered closure and use of closed suction drain can reduce the incidence of hematoma formation and the risk of infection. Hematoma formation has been reported in (1%) to (10%) of patients following harvesting of iliac crest bone graft. One patient (2.5%) had large hematoma needed evacuation under GA. We think that this low prevalence was at least in part due to good exposure and meticulous hemostasis intraoperatively and to the use of a drain postoperatively. Two patients (5%) had temporary sensory loss of the iliohypogastric nerve and lateral femoral cutaneous nerve of the thigh, it is uncertain whether these symptoms were secondary to traction injury by assistant or to division of the nerves during incision or dissection at the time of the operation. As with any surgery, adjacent nerves and muscles can be damaged, nerves at risk include the lateral femoral cutaneous, iliohypogastric and ilioinguinal. Using surgical incision superior or inferior to the iliac crest has long been known to reduce the chances of nerve damage with 2 cm dorsal to the ASIS in order to avoid injury to the lateral femoral cutaneous nerve. In our study, the rate is lower than reported rates in the literatures, which have ranged from (8.3%) to (10%) following anterior procedures. One patient (2.5%) had superficial infection and 1 patient had wound dehiscence, contemporary series reported donor site infection rates of 5-21%. We think that this low prevalence was at least in part due to proper technique, aseptic conditions and postoperative antibiotics. Schnee et al. reported a significant increase of donor site infection and dehiscence in women, obese patients and in those patients in the presence of medical risk factor. Two patients (5%) had transient donor site pain lasted less than 2 months, pain developed immediately postoperatively and all pain resolved by 2 months postoperatively. The precise cause of donor site pain remain obscure. We can postulate that either muscular or periosteal secondary to the excessive stripping of the muscles from the ilium or neurogenic secondary to sensory nerve injury. However pain which closely related to position at donor site, as typically aggravated by walking.
may indicate a local muscular or periosteal origin\(^{(14)}\). The results obtained in our study similar to result obtained from the study of (Elke, 2002,Amy, 2006)\(^{(3)}\).

**Conclusions:**
Iliac crest bone graft has considered as a main bank for obtaining bone; it’s safe, well-accepted procedure, with relatively low complications that can used for a wide variety of maxillofacial procedures. The superior- lateral approach is associated with highest level of complications at donor site probably due to excessive muscle stripping and reflection of gluteal muscles. The lateral approach is associated with the lowest level of complications at donor site mostly due to little muscles stripping in this approach. Donor site complications were higher in patients when both tables were involved in bone graft procedures and preferably harvested through a trap door, tricortical bone graft should be avoided altogether. Donor site complications were higher in patients when mandibular reconstruction needed due to size and type of bone graft. Good reapproximation of the muscles and fascia lata attaching to the ilium, by minimizing muscles dissection and by rigid closure of the defect results in leaving the patient with minimal postoperative complications.

**Suggestions**
Studying the local infiltration of the donor site wound with local anesthesia to reduce postoperative donor sit pain, the technique is simple and required no special equipment. Research in the field of bone tissue engineering. Research in the field of mesenchymal stem cells for reconstruction of facial skeleton.

**REFERENCES:**