Releasing Incisions Using Upward-Motion Scissors Technique for Flap Mobilization for Guided Bone Regeneration or Periodontal Surgery: Technical Introduction and a Case Report

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Flap management is one of the key elements for success in periodontal surgeries and bone regeneration for dental implants. The aim of this article is to introduce a releasing incision method for effective flap advancement to obtain tension-free primary closure. The ‘upward-motion scissors technique’ (UMST) involves the use of surgical scissors handled with an upward motion to create multiple shallow incisions. The use of UMST is demonstrated in an anatomically challenging case requiring bone augmentation. This technique provides a novel approach for flap advancement and may reduce potential complications involved in releasing incisions. The true benefit of UMST needs to be evaluated in future studies.


A critical phase for guided bone regeneration or periodontal surgery is the closure of the grafted areas with a tension-free adaptation of the mucoperiosteal flap. If primary closure is not achieved with a tension-free flap adaptation, impaired healing may result from flap dehiscence and wound exposure during the healing process, leading to an suboptimal outcome in regenerated bone volume.

Before making periosteal releasing incisions, it is necessary to understand the anatomy related to the periosteum and the course of blood vessels supplying the alveolar mucosa and gingiva. The periosteum consists of an inner layer (next to the bone surface) composed of osteoblasts surrounded by osteoprogenitor cells, and an outer layer rich in blood vessels and nerves and composed of collagen fibers and fibroblasts. Blood supply for the gingiva and periosteum comes from supraperiosteal vessels, which run roughly parallel to the long axis of teeth, branch and subdivide in the lamina propria of the gingiva, and form the vascular network on the periosteum. When full-thickness flaps are raised, releasing incisions that extend deep into the underlying tissue (outer layer of the periosteum and beyond) should be avoided to minimize damage to the microvasculature and nerves.
The traditional flap design to attain tension-free primary closure involves two vertical releasing incisions in combination with a periosteal releasing incision. This is a straightforward and predictable method that can be performed by most experienced clinicians. However, one shallow releasing incision sometimes cannot achieve a complete passive closure of the flaps. To overcome this, a different approach to releasing incision is needed.

The aim of this article is to introduce the “upward-motion scissors technique” (UMST), which involves creation of multiple shallow superficial releasing incisions in 1-mm intervals and provides complete passive closure for safe and predictable periodontal/bone regeneration therapy.

Materials and Methods

Flap Advancement Using the UMST

After local anesthesia is administered, a broad full-thickness mucoperiosteal flap is elevated. When working near the mandibular premolar region, the mental foramen is marked and the mental nerve is isolated. Necessary interventions to bone or other periodontal tissues are then performed.

Following vertical incision, a series of releasing incisions are made with the UMST (Fig 1). With UMST, it is important to always avoid the incision site where the thickness is very thin. Otherwise, necrosis of the flap may result due to compromised blood supply and chewing forces in the area. Flap thickness can be confirmed visually by observing the longitudinal section of the flap at vertical incision. The incision is started by holding the flap straight up with a hemostat. A pair of scissors (preferably Goldman Fox #1, G Hartzel and Son) is then inserted between the periosteum and the underlying soft tissue. The periosteum is incised with upward motion using the scissors, lifting the layer of periosteum to avoid damage to the vessels and nerves (Fig 2). After the incision has been made, it is always necessary to go back to the incision line with the blunt side of the scissors to make sure the thin periosteal fibers are not left behind. This confirmation will maximize the release of every incision. The subsequent incision starts 1 mm apical from the first one, and the same technique is repeated here (Fig 3).

Once adequate release of the flap is obtained by multiple incisions with the UMST, flaps are gently advanced and sutured with horizontal mattress and interrupted sutures to secure the closure.

Clinical Case

A systemically healthy 42-year-old woman presented with a chief complaint of masticatory disturbance and deviation of the jaw to the left after losing the left mandibular molars. The bone defect was a combination of horizontal and vertical atrophy, with the horizontal being more significant. The patient elected to have implant treatment and the following treatment plan was proposed and accepted by the patient.

One hour before the surgery, amfenac sodium (25 mg) and bacampicillin hydrochloride (Pengood, 750 mg) were administered. The patient rinsed her mouth with 0.025% w/v benzalkonium chloride solution prior to the surgery. After administration of local anesthesia with Xylestesin-ATM (3M Japan), incisions including a vertical incision were made and a full-thickness flap was elevated. The mental foramen was marked and the mental nerve was isolated. Releasing incisions were made with the UMST. Following confirmation of adequate flap release, decortication of the surrounding bone was
Three Osseotite NT Certain implants (3i Biomet) were placed with an insertion torque of 50 Ncm (Fig 4). While preparing the osteotomy using Quad Shaping Drills (3i Biomet), autogenous bone was harvested. An 18 × 25-mm TriStar Titanium Mesh (Impladent) was customized to cover the buccal dehiscence about 8 mm in height, with the expectation that the mesh would allow for 3 mm of horizontal bone regeneration. Harvested autogenous bone was placed to cover the exposed implant surface, then deprotenized bovine bone mineral (Bio-Oss, Geistlich Pharma) was used to fill the rest of the space in the mesh. The mesh was stabilized with customized cover screws to stabilize the bone graft materials. The mesh was placed over the mesh. The wound was completely closed with passive flaps achieved by the UMST. Horizontal mattress and interrupted sutures with 5-0 monocryl (Ethicon) were used to secure the closure of the flaps (Fig 6). Postoperative antibiotics (Pengood 250 mg every 8 hours for 7 days) and analgesics (amfenac sodium 25 mg, as needed) were given along with postoperative instructions.
At 9 months after the surgery, the second-stage surgery was performed to expose the implants. Upon removal of the titanium mesh, excellent bone regeneration was noted. A large defect initially 8 mm in size was completely covered with 3 mm of horizontal bone (Fig 7). A free gingival graft was performed to augment the zone of keratinized tissue around the implants. After the healing of the soft tissues, the final restoration was constructed and a screw-retained implant-supported porcelain-fused-to-zirconia bridge replacing the mandibular left first and second premolars and first molar was delivered (Fig 8). The 3-year postoperative radiograph demonstrated the stability of the crestal bone (Fig 9).

Discussion

In this report, the authors introduced the UMST for flap advancement and presented an anatomically challenging case that involved the use of UMST. Based on the experiences of more than 100 cases performed over the last 9 years, the authors recommend this surgical technique, particularly in cases where potential damage to nerves or blood vessels are of concern.

Even with an understanding of the critical anatomy, surgical procedures including releasing incision can be challenging when anatomical abnormalities are present. For releasing incision, a single incision can be made with a scalpel instead of scissors. However, it can be difficult to control the depth of the incision with a surgical blade. Different approaches for flap advancement to attain tension-free primary closure have been reported. One example is the use of a buccal periosteal pocket. This technique increases soft tissue mobility and elasticity and allows better support of bone substitute material. However, it is necessary to advance a periosteal elevator deep into the subperiosteal soft tissue area. This could still
cause injuries to microvasculature and nerves. With the UMST, multiple shallow incisions are made using curved scissors with the tip carefully controlled and facing upward, avoiding potential damage to underlying tissues.

Even though most incisions made with the scissors are clean and accurate, some thin periosteum fibers can be left behind. Thus, it is important to go back with the blunt side of the scissors to trace the incision and identify any tags from the remaining fibers. Once the fibers are identified, the scissors should be used to cut them to make sure the flaps can be fully extended. Any curved scissors of appropriate size can be applied to perform the UMST. However, based on treatment experience, a preferred choice is Goldman Fox #1. Some modifications, such as a slightly longer handle and a duller tip, may greatly improve its handling and safe operation.

An area where it is difficult to place a releasing incision is near the maxillary tuberosity, where the coronoid process is present. Due to the limited access to the area, it is extremely difficult to control the incision with a surgical blade. If the incision is too deep in this area, damage to the pterygoid plexus could occur.16 Based on the authors’ experience, the UMST can provide easier access to precisely place 1-mm incremental incision lines, even in undercut areas of the maxillary tuberosity.

The UMST involves multiple incisions. Although the incisions are shallow and are performed with the curved scissors in a carefully directed upward motion, this technique should be performed under supervision of a skilled surgeon until enough experience is gained. With the UMST, the use of a microscope or surgical scope is recommended to control the angle and depth of the incision and the extension of the flap to further minimize potential complications.

Information is still limited on the effects different incision placements have on the amount of flap extension.10 Therefore, clinicians have to predict the amount of flap extension based on their experiences or assumptions.10 Further studies are needed to establish safe and predictable releasing incision design for flap management.

Conclusions

Within the limitations of the authors’ experience, the upward-motion scissors technique (UMST) may prove to be an effective method to secure flap advancement in areas where a surgical blade is difficult or unsafe to make releasing incisions. More studies are needed to validate the clinical results of the technique presented here.

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References