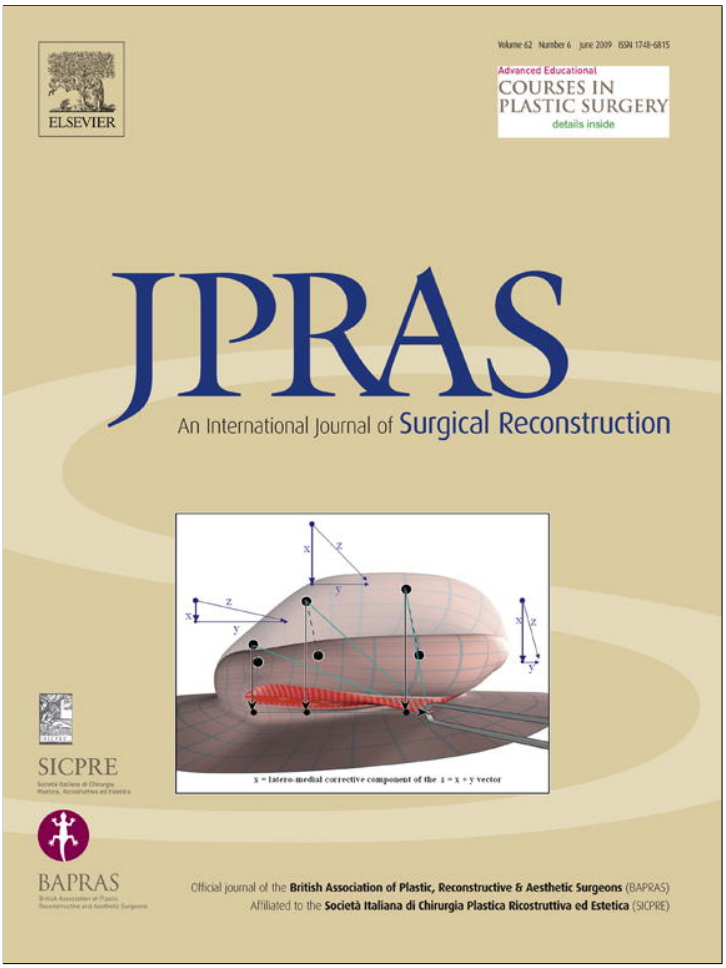

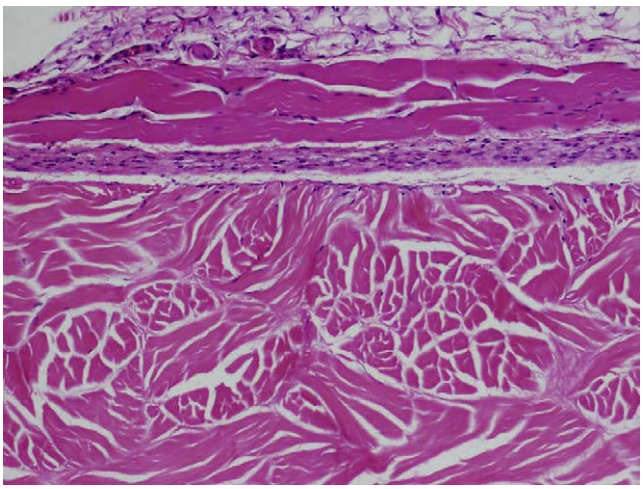

Figure 3 Magnified view of AlloDerm excised after 3 months. Specimens show only slight enveloping with minimal inflammation.

Although much further study is needed before recommendations can be made, these preliminary findings suggest potentially significant clinical implications. Micro- and macroscopic differences in behavior between these tissues may require more thorough preoperative planning based on target implant site and anticipation of long term consistency. For instance, placement of Enduragen within superficial breast tissue may be complicated by long term graft palpability and firmness. In contrast, use of this product as a dorsal nasal onlay or alar graft may be advantageous. With time, this material may become more cartilage-like in both form and consistency, an asset in well-defined or stress-bearing areas. The gross structural breakdown observed in AlloDerm tissues may discourage future use in facial locations requiring well defined contour. However, the long term, soft pliability of both AlloDerm and Dermamatrix are valuable in abdominal, breast, or extremity reconstruction.

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The fate of an extruded biodegradable mandibular plate

After the introduction of biodegradable plates and screws for maxillo-facial fixation over the last decade, there have been many studies related to safety, indications, contraindications, complications, outcomes and other aspects of clinical use.[1–5] Degradation by converting into CO_2 and H_2O via bulk hydrolysis by the liver removes the need of re-operation to remove the plates and screws. Problems associated with metal fixation such as growth disturbances in young children, hypersensitivity to cold exposure, interference with radiological evaluation, stress shielding and bone resorption are no longer considerations.

Although there have been some drawbacks in using biodegradable plates and screws for mandibular fracture, such plates are being widely preferred for the treatment of maxillo-facial fractures. We present an unusual complication, an extruded resorbable plate placed over the fracture line of mandibular symphsis which was followed to see its fate and the effects on the bone healing without performing any surgical intervention.

The patient, a 15-year-old boy, had symphsis mandible fracture resulting from a motor vehicle accident. When he was first seen and examined in the emergency department, there were lost teeth, mucosal lacerations and a displaced symphsis mandible fracture. Three days after the accident, he underwent an operation for fixation of mandibular fracture under general anaesthesia. Through a labiogingival incision, both fracture sides were dissected from the soft tissue, and then open reduction was achieved meticulously. After heating in a warm bath and bending, the first biodegradable plate with four holes was placed over the lower margin of the mandible and fixed with four screws, and the other plate was fixed just above it using four screws. The incision was closed with an absorbable polyfilament suture. The plates and screws used in the fixation of the fracture were 2.5 mm in thickness and 6 mm in length, respectively, and were composed of L-polylactic acid, D,L-polylactic acid and trimethylene carbonate. Neither intraoperative nor postoperative maxillo-mandibular fixation was used; also, no supporting mandible splint was worn. The patient received oral antibiotics with analgesic, and a liquid diet for 10 days post-operatively.

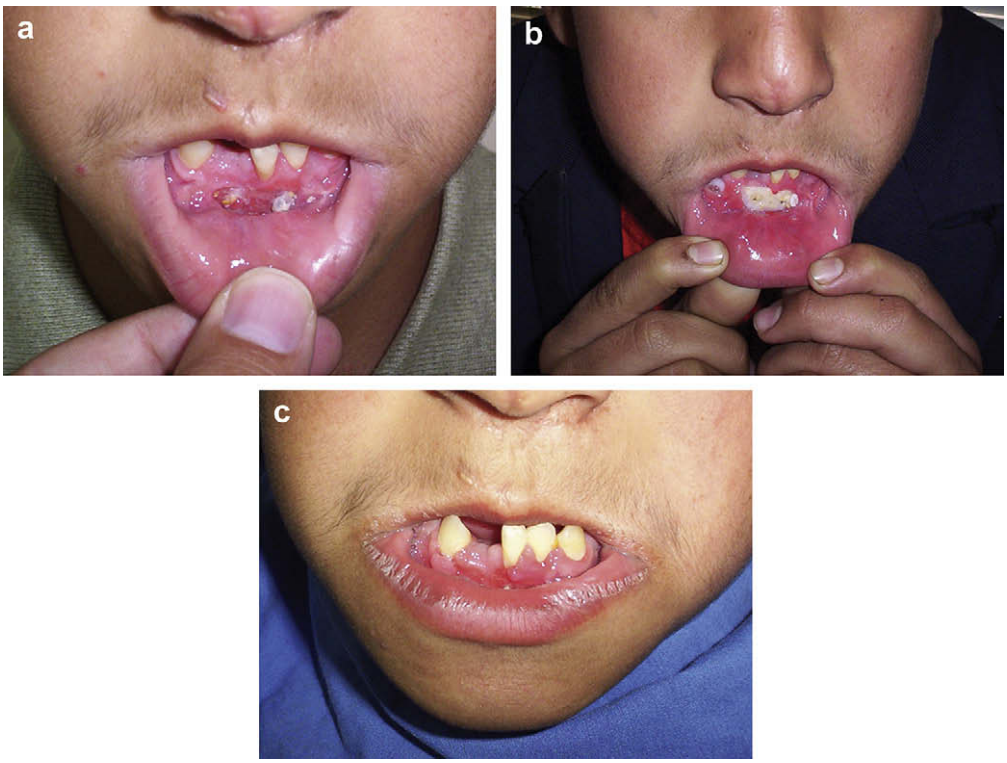

Figure 1 (a) Appearance of the wound dehiscence 11 days after the fixation of the fracture with biodegradable plate and screws, showing an extruded screw. Note that the plate and other screws were covered by mucosa and there was no any sign of reaction to the materials or infection. (b) View of almost entirely exposed plate and screws at about 4 months after the operation. The lower plate on the inferior margin of the mandible was not affected by the extrusion. (c) Ten days after the previous figure, the appearance of the plate and screws having broken down spontaneously only 1 h after falling into mouth.

Subsequently, a soft diet was recommended until bone healing completed. Eleven days after operation, at the middle of the incision site, a wound dehiscense occured, resulting in the exposure of a screw without any signs of infection or tissue reaction to the implants (Figure 1a). An oral antibiotic was started together with recommendations for meticulous oral hygiene. A weekly follow-up was scheduled to assess evaluation of bone healing as well as the progress of the exposed implant.

On the initial follow-up examinations, mucosal healing and epithelial migration seemed to be able to cover over the screw or at least to protect the other parts of the fixation materials, but 4 months after the operation, the upper plate and its screws became almost entirely extruded without infection, granulation tissue or reaction to the material. The lower plate placed at the inferior margin of the mandible was not disturbed by the course of the upper plate (Figure 1b). The exposed plate and screws broke down and fell into the mouth before any surgical intervention and the remaining mucosal wound healed spontaneously (Figure 1c). Bone healing progressed uneventfully and neither malunion nor nonunion developed. On examination 2 years after the fracture, no problem was found.

Based on the results presented in this patient during a follow-up of 2 years, it would appear that biodegradable materials are at least as biocompatible as titanium, leading to minimal foreign body reaction in the tissue, so that possible complications such as extrusion and infection may have a minimal effect on bone healing. Fracture union does not appear to be endangered either. If there is no movement at the fracture site, a conservative approach to the management of an exposed plate or screws may be an alternative choice to re-operation, even if the extrusion occurs in the early post-operative phase.

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Late post operative haemorrhage from internal mammary perforators

We report on three cases from different surgeons of late haemorrhage, two after reconstructive breast surgery and one after breast augmentation, involving the internal mammary perforators necessitating evacuation and emphasise the need for ligation to avoid the recurrence. In all cases electrocautery was used as the method to achieve haemostasis using a hand held device in 'coagulation' mode.

Case 1: A 39-year-old woman with a strong family history of breast carcinoma and a biopsy proven 6 mm lesion in the left breast underwent a bilateral deep inferior epigastric perforator (DIEP) flap and reconstruction. One week post operatively she complained of increasing discomfort in the left breast. On examination the pain was severe and the left breast was visibly enlarged. A 600 ml haematoma was evacuated in theatre. A bleeding internal mammary perforator was over-sewn; both the pedicle and the internal mammary anastamosis were patent. Subsequently discharge and recovery were uncomplicated.

Case 2: A 44-year-old woman presented with ptosis of both breasts and underwent a standard mastopexy. The patient was discharged on the 2nd day and was reviewed for a routine follow-up appointment 18 days after the procedure. Six hours after her presentation to the clinic, she returned with pain and swelling of the right breast. She gave a history of trying to open a door with force and then feeling something 'give' in her chest.

Clinical examination revealed bruising around this area and a very tense right breast. In theatre a large haematoma was evacuated. An active arterial bleeder from an internal mammary perforator originating from the anterior intercostal vessel in the second intercostal space was noted. This was secured with a polyglactin tie and the wounds closed. Her recovery was uneventful.

Case 3: A 42-year-old woman underwent bilateral breast augmentation. On the 12th day she described a sudden onset of pain and swelling in her left breast. She was taken back to theatre, a 650 ml haematoma was evacuated, the wound was closed. However, the next day her left breast had swollen again and a further haematoma of 550 ml was evacuated. In addition, a bleeding internal mammary perforator was discovered. This was ligated with a polyglactin tie. She susequently made an uncomplicated recovery.

Discussion

Electrocoagulation diathermy (mono-polar or bi-polar) and ligation (clips or ties) are the most common way to achieve surgical haemostasis. Traditionally diathermy has been used for smaller vessels and ligation for larger diameter vessels with high intra-luminal pressures.

Heat induced damage to the vessel walls leading to intravascular occlusive fibrin thrombosis has been postulated as the possible mechanism of haemostasis in gastric ulcers in a rabbit model when subjected to mono-polar electrocoagulation.[1]

One of the chief benefits of electrocautery is the ease and speed of use enabling both dissection and coagulation to be achieved without multiple changes of instrument. A study into tonsillectomy cases has shown a significant reduction in operative time when diathermy is used,[2] however with a high incidence of secondary haemorrhage when compared to ligatures.[3] The efficacy of diathermy has been found to be dependent on various factors including coagulation time, artery diameter and probe force application.[4] Arterial weld strengths have been tested to destruction by increased luminal pressure. The greatest vessel weld strength resistant to high intra-luminal pressures was found with highest force and coagulation time.[4] In addition, closure of vessels has been found to be more secure with bi-polar rather than mono-polar diathermy.[5] It is surgical judgement when closing medium sized vessels whether cautery will be sufficient or ligature or mechanical means of haemostasis will be required. The large number of small and large perforator vessels and their average size (1 mm for the artery and 1.7 mm for the vein) in the chest wall mean that diathermy is a commonly used method of haemostasis used by most surgeons usually without detrimental sequelae. There are cases, however, where we believe extra care should be taken to ensure haemostasis as the case reports show.

The high intra-luminal pressures that the internal mammary artery perforators are subjected to, make them particularly susceptible to bleeding if inadequate care is not taken to ensure haemostasis.

Late haemorrhage has been reported in reconstructive and cosmetic cases where implants have been used as well as in patients on anticoagulation therapies and even in the chronic setting. In our cases we observed that bleeding internal mammary perforators were responsible for the complications. We postulate that in all three cases the electro-cautery was not sufficient for long-lasting haemostasis due to a combination of vessel diameter and high intra-luminal pressures that the perforator vessels are subjected to.

In summary, whilst electro-cautery provides quick and efficient use of time for dissection haemostasis in certain scenarios we recommend that mechanical haemostasis (clips or ties) are safer than relying on electro-cautery to ensure haemostasis of either large diameter vessels or those with high intra-luminal pressures.