

# SCIENTIFIC ABSTRACTS ON ULTRASONIC OSTEOSURGERY WITH BONESCALPEL™



Use Of Ultrasonic Bonescalpel In Orthognatic Surgery

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Use of a Novel Ultrasonic Bone Scalpel for Osteoplastic Laminoplasty in the Resection of Intradural Spinal Cord Pathology

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Technical Note: A Novel Bone-Cutting Instrument, the BoneScalpel™, May be Useful in Performing Osteoplastic Laminoplasty

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# Use Of Ultrasonic Bone Scalpel In Orthognatic Surgery

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*Proceedings of the XX Congress of the European Association of Cranio-Maxillo-Facial Surgery, Bruges, Belgium, September 2010, Medimond International Proceedings*

## Abstract

### **Purpose**

In this preliminary study we evaluated the feasibility of orthognatic osteotomies with a new ultrasonic osteotome. By adapting its ultrasonic blade for dual action and introducing a soft protective element we have hence modified a powerful ultrasonic device that was originally developed for spinal osteotomies and nerve decompression (Misonix BoneScalpel™).

### **Materials and Methods**

28 patients underwent orthognatic surgery with the ultrasonic osteotome. All procedures within this study group were solely being performed ultrasonically and without use of reciprocating saws or rotary burrs. Effects on operation time, peri-operative bleeding, post-operative edema, nerve lesion and osseous consolidation were assessed.

### **Results and Conclusion**

A significant reduction of nerve impairment was observed as well as reductions in swelling, hematoma, operative time and hospital stay. Improved safety in the pterygomaxillary zone facilitates the down-fracture and the sagittal split is eased by propagation of the ultrasonic wave into the cancellous layer. The osseous cutting itself is more precise and allows for an improved adaption to the anatomy. Osseous consolidation was assessed as normal and complete.

# Use of a Novel Ultrasonic Bone Scalpel for Osteoplastic Laminoplasty in the Resection of Intradural Spinal Cord Pathology

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27th Annual Meeting of the AANS/CNS Section on Disorders and Peripheral Nerves, Phoenix, AZ, March 2011

## Abstract

### Introduction

Osteoplastic laminoplasty is a well described alternative to laminectomy in the treatment of spinal pathology. Recent studies have shown that laminoplasty may decrease the incidence of progressive kyphotic deformity when used in the setting of intradural spinal cord tumor resection, especially in the pediatric population. A novel device, the BoneScalpel™ by Aesculap, is an ultrasonic osteotome that precisely cuts bone while preserving the underlying soft tissues. In the case of laminoplasty, this potentially reduces the risk of dural laceration. In addition, the device allows for fine osteotomies as narrow as 0.5 mm, which may facilitate better post-operative bone healing.

### Methods

We present our experience with 11 patients who underwent osteoplastic laminoplasty using the BoneScalpel™ in the setting of intradural pathology between January 2009 and September 2010. Following lesion resection, titanium plates were used to reconstruct the lamina. The technical advantages and procedure-related complications of using an ultrasonic bone osteotome in the resection of intradural spinal cord lesions were analyzed.

### Results

Successful laminoplasty was carried out in all 11 cases. One case of incidental durotomy was noted following use of the device, which was repaired primarily without neurological or clinical sequelae. There were no cases of peri-operative complications such as wound infection or CSF leak. There was also no incidence of immediate post-operative spinal instability.

### Conclusions

The BoneScalpel™ by Aesculap is a safe and technically feasible device for performing osteoplastic laminoplasty. It allows for a narrower laminar trough to be created than conventional drilling, which may lead to improved laminar healing and prevent delayed post-laminectomy kyphosis. Further studies and longer clinical follow-up are needed to delineate the true role of this device in the treatment of spinal cord pathology.

**Note:** The Misonix BoneScalpel™ is manufactured and distributed worldwide, including the U.S.A., by Misonix, Inc. An OEM version of the device is manufactured for Aesculap, Inc., who distributes the product non-exclusively in the U.S.A. for bone fragmentation in spinal and cranial applications.

# Technical Note: A Novel Bone-Cutting Instrument, the BoneScalpel™, May be Useful in Performing Osteoplastic Laminoplasty

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*AANS/CNS Section on Pediatric Neurological Surgery Annual Meeting, Boston, MA, December 2009.*

## Abstract

### Introduction

Laminoplasty is a well described alternative to laminectomy in the treatment of spinal pathology. Recent studies have shown that laminoplasty used for pediatric intramedullary spinal cord tumor resection may decrease the incidence of progressive spinal deformity. A novel device, the BoneScalpel™ by Aesculap, is an ultrasonic osteotome that allows the surgeon to cut the bone while preserving the underlying soft tissue, potentially reducing the risk of dural laceration. In addition, it allows for very fine cuts as narrow as 0.5 mm. We used the BoneScalpel™ to perform osteoplastic laminoplasties in 2 patients undergoing surgery for spinal cord tumors and describe our preliminary findings.

### Methods

Two patients who were undergoing planned laminoplasty for spinal cord tumors were brought to the OR and standard exposure of the appropriate lamina was carried out. In order to perform the laminoplasty, the BoneScalpel™, was used to cut troughs on either side of the lamina. The cut lamina were then disconnected rostrally and caudally from the posterior spinal ligament, and removed as one unit. Once the tumor resection was completed and dura closed, the bone was replaced with small bone plating systems.

### Results

Successful laminoplasty was carried out in both cases. No known damage to the underlying soft tissue, dura or neural elements was identified.

### Conclusions

The BoneScalpel™ by Aesculap is a potentially useful and safe device in performing osteoplastic laminoplasty. As it allows for a more narrow trough than conventional drilling, less bone is ultimately removed. This could be especially useful in the pediatric population where the smaller defect in the approximated bone may lead to improved healing. Further studies should be carried out to explore this as a potential option.

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# Complex Facial Reconstruction by Osteoinduction: The First Ever Clinical Application of the Vastus Intermedius Perforator Periosteal Flap (VIPP) and Facial Skeletal Transplantation Without Immunosuppression

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*2nd Biannual Meeting of the American Society for Reconstructive Transplantation, Chicago, IL, November 2010.*

## Abstract

### Background:

The published Vastus Intermedius Periosteal Flap (VIPP) includes the entire periosteum of the femur dependent on the descending branch of the lateral circumflex femoral artery. A less bulky flap with reduced dissection can be harvested based on consistent musculoperiosteal perforators at the junction of the middle and distal thirds of the thigh. We report the first clinical application of the Vastus Intermedius Periosteal (VIPP) flap and provide video documentation of its vascularity.

### Methods:

a patient bone loss of the superior orbital bar, frontal region and temporal process of the zygoma was treated with the VIPP flap. An ALT skin paddle was dissected, four musculoperiosteal perforators were identified and dissected to periosteum and 80% of the circumference of the femoral periosteum was harvested. A thin 8 x 2 cm piece of femoral cortex was included. The vascularized bony frame replaced the orbital rim and the vascularized periosteum was placed over the remainder of the bony defect. A vascular anastomosis was performed between the pedicle and the superficial temporal vessels.

### Results:

The first ever VIPP flap was confirmed to have a robust vascularity. Its chimeric nature allowed easy monitoring of the skin paddle. Video documentation demonstrates that skin, muscle, periosteum and cortical bone bleed briskly when elevated with the pedicle. The flap suffered two hematomas on days 2 and 5 which required evacuation and evaluation in the operating room. On day 7 the skin paddle was excised. Periosteal flap and osseous construct were left in place.

### Conclusions:

We confirm vascularity of the VIPP flap for osteoinduction. Computed tomography evaluation of osteogenesis is shortly pending. This flap allows consideration of a new technique of reconstructive transplantation, osseous transplant without immunosuppression. Long bone periosteum is osteoinductive and capable of replacing large masses of bone. Using a VIPP flap, a processed cadaveric segment of facial skeleton can precisely restore human form with the patient's own cellular machinery. This technique may be the ultimate answer to complex facial skeletal reconstructions until the science and art of facial transplantation becomes widely applicable. We are initiating a series of reconstructions with specific facial skeletal allograft and VIPP flap.

**Note:** A novel ultrasonic osteotome (Misonix BoneScalpel) was used to resect the femoral periosteum of the VIPP flap.

## Ultrasonic BoneScalpel™

The BoneScalpel is manufactured and distributed by Misonix, Inc., Farmingdale, NY, USA.

### Indications

The BoneScalpel system is indicated for use in the fragmentation and aspiration of both soft and hard (e.g.: bone) tissue as used in the following surgical specialties:

- Orthopedic Surgery
- Plastic and Reconstructive Surgery
- Neurosurgery
- Thoracic Surgery
- Wound Care
- General Surgery

It is also indicated for use in debridement of wounds, such as, but not limited to burn wounds, diabetic ulcers, bedsores and vaginal ulcers, soft tissue debridement and cleansing of the surgical site in application, in which, in the physician's judgment would require the use of an ultrasonic aspirator with sharp debridement.

**CAUTION:** Federal law restricts this device to sale by or on the order of a licensed healthcare practitioner

### Contra Indications

The BoneScalpel system is contra indicated for cardiac surgery and any procedure in the proximity of the heart.

The irrigation pump is contra indicated for the administration of parenteral fluids, infusion of drugs or for any life sustaining purposes

### Trademark Information

Misonix® is a registered trademark of Misonix, Inc., Farmingdale, NY

BoneScalpel™ is a pending trademark of Misonix, Inc., Farmingdale, NY



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