# Piezoelectric Surgery

Piezoelectric Surgery, is a technology that allows for the osteotomy of mineralized tissue with less risk of damage of underlying soft tissue structures. This selective cutting increases the safety of osteotomies performed in close vicinity to delicate structures such as dura mater, blood vessels, and nervous tissue.

## Indications

## Laminectomy

A piezoelectric, dorsal laminectomy technique was developed using ovine cadavers. Following technique development, six live sheep underwent a piezoelectric (n = 6) two-level dorsal laminectomy at L2-L3 and L4-L5 (PiezoL2-3,4-5), and another 30 live sheep underwent a three-level laminectomy at L1, L3, and L5 (PiezoL1,3,5) for a total of 102 laminectomy sites. Surgery time and postoperative complications were recorded.

Dorsal laminectomy was safely and accurately performed in 35/36 study sheep using a Piezoelectric surgical instrument. No dural tears were noted in any animal. Non-ambulatory paraparesis in one study sheep (PiezoL1,3,5) led to euthanasia at 48 hr and only mild epidural hematoma was noted on necropsy. No other major postoperative complications were observed in any of the animals. Subjectively, PiezoL was easy to perform and with a rapid learning curve. Mean surgery time was 105 min (range: 75-165 min; median: 97.5) for PiezoL2-3,4-5 and 93 minutes (range 55-100 min; median: 67.5) for PiezoL1,3,5.

PiezoL is considered a safe and viable technique for performing ovine dorsal laminectomy in the preclinical research setting [1].

## Endoscopic transsphenoidal craniotomy

In a cadaveric model, the piezoelectric endoscopic transsphenoidal craniotomy (PETC) is technically feasible. This technique allows the surgeon to create a bone flap in endoscopic transnasal approaches similar to existing standard transcranial craniotomies. Future trials will focus on skull base reconstruction using this bone flap [2].

1)
Duerr FM, Seim HB 3rd, Bascuñán AL, Palmer RH, Easley J. Piezoelectric Surgery -A Novel Technique for Laminectomy. J Invest Surg. 2014 Dec 1. [Epub ahead of print] PubMed PMID: 25438097.
2)
Tomazic PV, Gellner V, Koele W, Hammer GP, Braun EM, Gerstenberger C, Clarici G, Holl E, Braun H, Stammberger H, Mokry M. Feasibility of piezoelectric endoscopic transsphenoidal craniotomy: a cadaveric study. Biomed Res Int. 2014;2014:341876. doi: 10.1155/2014/341876. Epub 2014 Feb 9. PubMed PMID: 24689037; PubMed Central PMCID: PMC3933521.