



## BETHANIA SPINE BASE

UNDER THE AUSPICES OF THE  
INTERNATIONAL SOCIETY FOR MINIMAL INTERVENTION IN SPINAL SURGERY  
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# ABSTRACTS

INTERNATIONAL 27<sup>th</sup>

## COURSE FOR PERCUTANEOUS ENDOSCOPIC SPINAL SURGERY AND COMPLEMENTARY MINIMAL INVASIVE TECHNIQUES

SYMPOSIUM WITH INTERNATIONAL GUEST FACULTY  
& WORKSHOP DEMONSTRATIONS / TECHNICAL EXHIBITION

C o u r s e C o - C h a i r m e n :

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January 29 / 30, 2009, Bethania Hospital

C H - 8 0 4 4 Z u r i c h - S w i t z e r l a n d

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S S O / S G O - C M E - C r e d i t s : 1 6

## Endoscopic interlaminar lumbar disc surgery with Easy GO

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Minimally invasive spine surgery is under intense investigation. However, many endoscopic systems are difficult to apply and handle.

The authors developed a new system for endoscopic spinal surgery. The main goals for this system were easy application and intraoperative handling as well as avoidance of a difficult and prolonged learning curve for experienced spine surgeons. The system consists of various dilators, three different work tubes, a 30° optic fixed to the work sheath in a flexible position, and an endoscope holder. Through the work sheath, the procedure can be performed using standard microsurgical skills with bimanual technique.

Since August 2006, 89 lumbar spinal surgeries for lumbar disc herniation and lumbar stenosis (mean age 52 yrs, range 22-85 yrs) have been performed with this system. In all intraoperative situations, the system was easy to handle. Mean surgical time scored 75 min (range 28 – 168 min). An immediate reduction of radicular pain was observed in all patients (100%). No CSF leakage, no root injury and no new postoperative neurological deficit were observed. In four cases, the endoscope was abandoned, and the procedure microsurgically continued (4.4%). At the last follow up visit (mean FU 10 ms, range 2 wks up to 21 ms), a significant reduction of radicular pain allowing the patient to continue in their normal daily activities was observed in 89% (71/80). Four patients suffered from recurrent disc prolapses (4.4%) within the follow up. Another five patients (5.6%) were not satisfied with the result and complained of severe lumbar or pseudoradicular pain without any evidence of re-prolapse or re-stenosis.

In conclusion, the Easy GO system was easy and safe to handle with the standard bimanual microsurgical technique. Good postoperative results were achieved. The system provides an alternative to other endoscopic techniques particularly for those who want to avoid a prolonged learning curve to perform minimally invasive endoscopic procedures. ♦

## Transforaminal endoscopic stenosis surgery (TESS)

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A new endoscopic procedure, the "Transforaminal Endoscopic Stenosis Surgery" (TESS), is presented. This technique is performed through a posterolateral transforaminal approach and allows widening the foramen in a collapsed lumbar disc by undercutting the superior facet under direct endoscopic control. A new endoscopic small reamer is used for this purpose that allows minimizing the aggression to the surrounding tissues.

This study of 216 cases of lumbar foraminal stenosis compares the results of one group, in which the new endoscopic bone reamers were used for the foraminoplasty, with another group, in which only classical foraminoplasty was performed with a standard Holmium-YAG laser.

Methods : 216 patients with lumbar foraminal stenosis underwent endoscopic spine surgery from 2003 to 2008 at Centro Médico Teknon in Barcelona (Spain). 125 patients underwent classical endoscopic surgery, thus, only a Ho-YAG laser was used for the foraminoplasty (Group A). 91 patients underwent TES surgery, hence, the new endoscopic bone reamers were used for the foraminoplasty (Group B).

The inclusion criteria were: a) unilateral or bilateral radicular leg pain associated to image evidence of foraminal or lateral stenosis. b) Inadequate response to conservative treatment for > 6 months.

All 216 procedures were performed in prone position and under local anesthesia. Pain was scored for every patient, pre- and post-operatively, with a Visual Analogic scale (VAS) and the disability with the Oswestry Disability Index (ODI). The post-operative scores were updated every 3 months. The mean follow-up period was 2.8 years (with a range of 6 - 61 months).

Results : 216 patients who met the inclusion criteria underwent TES surgery. These 216 patients comprised 143 men and 73 women with ages ranging from 17 to 82 years (mean age 45.8 years). The overall results, evaluated according to Macnab criteria, for the 216 cases were: 151 excellent (69.9%), 45 good (20.8%), 16 fair (7.4%), 4 poor (1.9 %). Results for group A (125 cases): 90 excellent (72%), 20 good (16%), 14 fair (11.2%), 1 poor (0.8%). Results for group B (91 cases): 61 excellent (67%), 25 good (27.5%), 2 fair (2.2%), 3 poor (3.3%).

The surgical time average was of approx. 50 min. for group A, while the surgical time average was of approx. 30 min. for group B.

**Conclusions :** This study demonstrates the efficacy and efficiency of a new surgical technique (TESS) for foraminal stenosis that uses bone reaming under direct endoscopic control to widen the foramen in cases of foraminal or lateral stenosis. This endoscopic technique appears to be more accurate than other reaming techniques that only use X-ray C-arm control and have no direct endoscopic vision. Similar outcome and scoring results were achieved by the laser foraminoplasty and the reamed foraminoplasty but the latter was more efficient as it presented a lower average surgical time (approx. 20 min less) and lower material costs. This new endoscopic reaming technique opens the way for surgeons to primarily avoid more aggressive methods of decompression and minimize the surgical costs. ♦

### **TES<sup>TM</sup>: transforaminal endoscopic lumbar surgery: technique/experience since 2004**

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a) Introduction : Meaning of TES<sup>TM</sup>: Transforaminal Endoscopic Surgery. Main Indications for this surgical technique : Decompression and dilation of the Intervertebrale Foramen, Removal of any kind of lumbar disc herniations, Decompression of the nerve root and the dura mater, Removal of scar tissue at patients which already had been operated (Microlaminektomy, Microdisectomy)

According to own studies and studies of other surgeons, Transforaminal Endoscopic Surgery (TES<sup>TM</sup>) is an efficient operating technique with results that at least are comparable to results achieved with conventional methods in the indications mentioned above.

b) Material and Method : Study Design : retrospective, not randomised, clinical study. Objective of this study : The aim of this study is to investigate, if the TES<sup>TM</sup> technique can be seen as an alternative operating method for the treatment of lumbar disc herniations. Overview of background data/data base : After having clearly defined and observed the operating indications, the patient's stay in the hospital is being reduced to one day or treatment is being conducted in day care surgery. The stay in rehab can be avoided, all advantages of endoscopic surgery known come to the fore.

From April 2004 until September 2007, 321 patients in total (96 female; 225 male) have been operated in our occupancy section. The age average was 53 years (min. 19/ max. 84 years). Data evaluation was made by single/multilevel TES<sup>TM</sup> surgeries. Patients have been questioned 6 weeks, 3 months, 6 months, 1 year, 3 years after surgery via questionnaires and functional checks (e.g. VAS). With this, subjective as well as objective data has been collected.

c) Results: The results of VAS (Visual Analogus Score), satisfaction of patients, attitude towards recommendation and efficiency have been comparable or even better when being compared with results achieved with conventional methods. The recidive rate was very small; only 12 patients have had to be operated again.

d) Discussion: It should be considered and discussed if, despite a relatively long learning curve, endoscopic surgery can or will replace open techniques. Additional prospective randomized studies should be initiated to confirm these results. ♦

### **Transforaminal endoscopic discectomy and foraminoplasty after FBSS**

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**STUDY DESIGN** A multicentric study concerning 125 cases still suffering from a radiculopathy after interlaminar open surgery, have been evaluated at 3 and 12 months after Transforaminal Endoscopic Discectomy (T.E.D.).

**PURPOSE** To evaluate efficacy and safety of TED, after failure of translaminar open surgery.

**SUMMARY OF BACKGROUND DATA** This study follows a multicenter study of selective lumbar endoscopic discectomy published in December 2005 at the French GIEDA's congress, concerning 644 patients presenting a radiculopathy secondary to a lumbar disc herniation treated by the Y.E.S.S. technique. This study included all sorts of herniations and the senior author reported a series of 46 patients presenting a Y.E.S.S. and with a success rate of 87% after TED.

**METHOD** This study concerns 125 patients presenting FBSS and evaluated 3 and 12 months after their index operation. A provocative discography was systematically performed. Sex ratio was M/F = 65/60. Average duration of the symptoms was 17.46 months. 13 patients had TED at 2 levels and 30 patients had

aminoplasty associated. The radiological findings (MRI, SCAN, Discography) showed: 74 recurrences at same level, 6 sequestered fragments, 16 foraminal herniations, 30 foraminal stenoses, 13 disk herniations at another level.

**RESULTS** At 3 months post operatively we noted that: - the neurological signs had disappeared in 76% of the cases. - the radicular pain was reduced in average by 74% on the AVS and the lumbar pain by 48%. - the DALLAS score was reduced by 40% (112 cases), and the OSWESTRY score (17 cases) was also reduced by 75%. - Also, 79% of the patients considered the result as a success. At 12 months post operatively (79 patients) the results were: - Decrease of the radicular pain in average by 83% and 68% for lumbar pain. - Reduction of the DALLAS score by 48%. - Also, 87% of the patients considered the result as a success. - No major complications appeared in this study.

**CONCLUSION** In our experience, results are poor after second open surgery. The transforaminal approach, to treat persistent radiculopathy after FBSS can be recommended. The main advantage of this technique is to avoid a second transcanal effraction, and the risk of scarring complications. The MRI doesn't always help in the diagnosis, as the presence of intracanal scar tissue can mask a disc herniation. In those cases, provocative discography is indispensable, being the only test able to reveal a remaining or recurrent symptomatic disc herniation. Also, very careful thermomodulation must be used especially in case of previous open surgery, because of neurogenesis and angiogenesis, often found in the disc cavity after retracting inflamed disc fragments, and causing discogenic pain. ♦

### **Endoscopic transforaminal discectomy for recurrent lumbar disc**

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Recurrent disc herniation is a significant problem as scar formation and progressive disc degeneration may lead to increased morbidity with re-operation. The advantage of the ETD is that there is no need to go through the old scar tissue. Purpose of this prospective study was to review complications and results of the Endoscopic Transforaminal Discectomy (ETD) for recurrent herniated discs.

**Material and Methods:** 262 consecutive patients over a four year period with a MRI proven recurrent disc herniation in the lumbar spine with primarily radicular symptoms who did not respond satisfactory to conservative treatment over were included in this prospective clinical study. From a lateral approach first the intervertebral foramen was enlarged and a working cannula was inserted into the spinal canal. The prolapsed or extruded part was removed under endoscopic view with special forceps's. With a special reamer the inferior endplate was perforated, abraded and all loose intradiscal fragments were removed.

**Results:** 3 months post-operative all patients underwent a clinical evaluation and at two years post-operative 90.8% returned an extensive questionnaire including VAS Scores, MacNab Score as well as subjective satisfaction assessment. At two years 85.7% of the patients rated the result of the surgery as excellent or good. 9.7 % reported a fair and 4.6 % patients an unsatisfactory result. Patients recorded an average improvement of their leg pain of 5.9 points and 5.7 points of their back pain on the VAS scale (1-10). According to Mac Nab criteria 30.7% of the patients felt fully regenerated, 50 % felt their efficiency to be slightly restricted, 16.8% felt their efficiency noticeably restricted and 2.5% felt unaltered. All patients had a 3-month follow-up where possible complications were registered. 3 transient nerve root irritations and 6 (2.3%) early recurrent herniations (<3 months) were reported. There was no case of infection or discitis. 11 patients have been re-operated for recurrence, after 3 months and within 2 years (4.6%).

**Conclusion:** Endoscopic Transforaminal Discectomy appears to be an effective treatment for recurrent disc herniation with only few complications and a high patient satisfaction. ♦

### **Full-endoscopic cervical discectomy with posterior and anterior approach**

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The therapy of degenerative diseases of the spine involves both medical and socioeconomic problems. A surgical procedure may be necessary if conservative measures have been exhausted and states of

acerbated pain or neurological deficits persist. Despite good therapeutic results with conventional operations, there may be consecutive damage due to traumatization. Thus, it is important to continuously improve these procedures. Taking existing quality standards into account, the objectives must be to minimize operation-induced traumatization and negative long-term sequelae. Current research results and technical innovations must be critically applied in order to guarantee the best-possible treatment strategies.

Minimal-invasive techniques can reduce tissue damage and its consequences. Endoscopic operations under continuous fluid flow bring advantages which raise these procedures in many areas to the standard level.

New optics have been developed with a wide working channel for spinal surgery which enable sufficient bone resection using burrs under visual control. These days, there are various full-endoscopic techniques available which can supplement each other. For the cervical spine, the anterior transdiscal and the posterior access are available. There are specific advantages and disadvantages for both techniques. The posterior access enables therapy of all lateral disc herniations. Unlike the anterior transdiscal procedure, which is the only treatment available for medial pathologies, the disc is not damaged and mobility is expanded.

Considering the indication criteria, now the combination of full-endoscopic approaches with the new developed endoscopes and instruments provides sufficient decompression under visual control of cervical disc herniations. The results are equal to that of conventional procedures, but with advantages of a truly minimally-invasive procedure.

However, total avoidance of known problems in spinal surgery can hardly be imagined. In addition, open procedures will remain as indispensable in the future as they currently are. At the moment the full-endoscopic procedures are estimated as a sufficient supplementation and alternative inside the complete spectrum of spine surgery. ♦

### **Percutaneous endoscopic treatment of lumbar and thoracic disc infection**

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Disc infection after previous disc surgery or in case of immunosuppression is a rare but severe disease of the spine. The therapeutic palette ranges from a patient conservative treatment, to anterior and posterior fusion after debridement of the focus. Sometimes, with regard to the choice of therapeutic options, an aggressive surgical treatment is impossible due to the comorbidity of the mostly older patients.

In lumbar or thoracic disc infections the postero-lateral endoscopic system is set up to deliver an antibiotic chain, to remove inflammatory debris, to gain a swap, and to irrigate the infected level resulting in spontaneous fusion.

to improve stability on the spine with preservation of soft tissue we can additionally use a newly developed technique and system of percutaneous transpedicular screw and plate fixation with regard to lordotic or kyphotic curves.

In 17 of 21 cases of a spondylodiscitis we could heal the infection, some with and some without an additional instrumentation. 2 patients died and in two patients an open anterior debridement with vertebral body replacement was necessary. Furthermore one female patient showed loosening of the transpedicular fixation with progression of the kyphotic deformity on the thoraco-lumbar junction.

Regarding the complications, the pure endoscopic approach is possible in the lordotic curve on the middle and lower lumbar spine and in cases of disc infection without osteolytic destruction of the adjacent endplates. In the thoracic spine or on the thoraco-lumbar junction the additional instrumentation is recommended. In most of the cases a significant pain relieve could be achieved and the infection parameters (CRP) continuously decrease. ♦