Ten years experience with the unilateral approach for the removal of intradural spinal schwannomas and meningiomas,

Alfredo Pompili MD; Vincenzo Anelli; Fabrizio Caroli; Francesco Crispo; Maddalena Giovannetti MD; Laura Raus; Stefano Telera MD; Antonello Vidiri MD

"Regina Elena" National Cancer Institute. Roma. Italy

Introduction The traditional uni-multilevel bilateral laminectomy has been the safest approach to the spinal canal for the removal of intramedullary and extramedullary-intradural tumors. Yasargyl suggested a more conservative unilateral approach, considering that at least 6% of the patients have post-operative spinal deformity and/or instability. Bilateral damage to the ligamentum flavum associated with disruption of the ligamentum interspinosum plays an important role. Stripping, dissection, and denervation of the posterior paraspinal muscle complex were also suggested to be responsible for post-laminectomy deformities. Also the more sophisticated laminotomy does not avoid the bilateral muscle disruption and the section of the interspinous ligament. Thanks to the diagnostic accuracy of MRI imaging and to microsurgical techniques, spinal tumors can be reached and removed via minimally invasive procedures

Methods 60 patients (32 females, 28 males) with MRI-diagnosed intradural schwannoma (total tumors were 63), and 14 with meningioma (13 females, 1 male) (14 tumors) were admitted and operated upon in our Division between June 2000 and June 2010. One patient with three tumors required a second operation as one of then was missed at the first one. Age ranged from 28 to 77 (average 53).
One pt had 3 adjacent Schwannomas, another 2. One pt had 2 dorsal Meningiomas located at different levels, that were removed in one stage operation.
6 Schwannomas were cervical, 20 dorsal (13 at the D11-D12 level), 34 lumbar. Those with multiple tumors were both lumbar. There were 5 dumbbell tumors: 2 cervical and 3 dorsal. Meningiomas were 4 cervical and 10 dorsal (one double). 27 patients had moderate to severe neurological impairment (10 meningiomas and 17 schwannomas).
Pain was practically a constant presenting symptom (only 5 without pre-op pain)

Surgical Technique
After careful X-ray identification of the level, a midline skin incision of 5-7 cm is done. The fascia is opened; under microscopic magnification, a limited unilateral unilevel laminectomy is performed, with bone forceps and/or high-speed drill, taking care to extensively remove the ligamentum flavum of the upper and lower interlaminar space.
The final dural exposure is a rectangle of about 1.5 x 3.5 cm. In some cases, in order to obtain adequate exposure, bone removal should be extended cranially/or caudally by another 1-1.5 cm. The dura is then opened paramedially. The roots and/or the cord are exposed.
One-piece removal was attempted only for small tumors (up to 2 cm) or for those that were easily dissected from the root and /or the cord.
The others were removed in pieces, either with bipolar and scissors and/or with ultrasonic aspirator. All schwannomas, except one with anterior cervical pial infiltration, were radically removed
Simpson's grade 1 removal was done in 5 meningioma , grade 2 in 10
The dura was closed with resorbable 5 -0 or 6-0 sutures in order to obtain a waterproof closure. Now we prefer unresorbable suture device
Duration of the operation ranged from 1h40m to 3h30m (average 2h20)

Results Pain was the presenting and persistent symptom al all but 5 patients. 27 had a neurological deficit .The uncomplicated patients were mobilized on day 3 and discharged on day 5-6. Post-operative pain was minimal and therapy was generally discontinuated after 24 hours. Four patients had orthostatic headache; two had a pseudomeningocele requiring reoperation. The most impressive, immediate result was on pain as evaluated by the Dennis Pain Scale: measured with the Wilcoxon signed rank test pain decrement was significant either at discharge or at 6-10 months ($p<0.0001$ for schwannomas and $p<0.001$ for meningiomas) Follow-up ranged from 12 to 126 months (average 62)
Neurological results were excellent/good: 27 cases had pre-operative moderate to severe neurological impairment: 12 recovered completely, 13 up to 80-90%, 2 up to 70%. The KPS scoring applied to all patients with deficit was evaluated with paired Student t-test: the overall KPS improved from 60 at admission to 90 at follow up ($p<0.0001$). For schwannoma patients it improved from an average of 63 to 90 ($p<0.0001$), for meningiomas from an average of 55 to 80 ($p<0.0002$). One patient with cervical malignant melanocytic schwannoma(partial removal) died 12 months post-op due to CSF dissemination, while still recovering.