

# Pedicle-hinged unilateral posterior arch recapping technique (P-UPART)

A new surgical technique  
for dumbbell-shaped cervical spinal cord tumors

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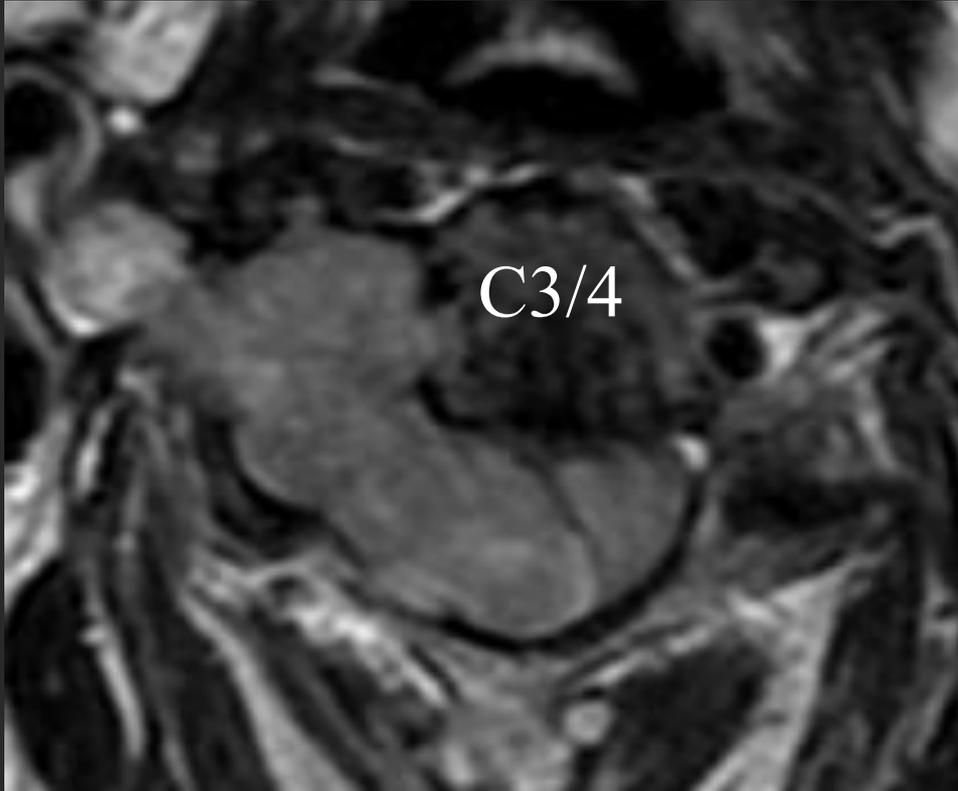
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*No conflict of interest*

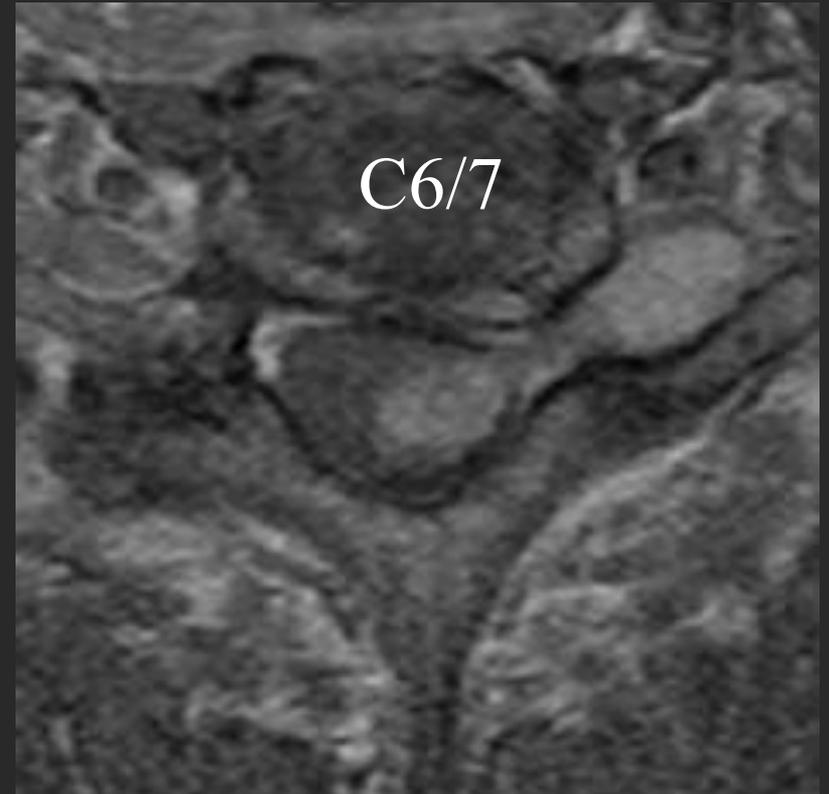
*A variety of problems  
after cervical spinal cord tumors excision*

1. Unstable spine
2. Spinal deformity
3. Rigid neck
4. Persistent neck pain
5. Deep wound infection
6. Prolonged CSF leakage
7. Revision surgery is always more difficult and invasive than initial surgeries.

## *Dumbbell-shaped cervical spinal cord tumors*



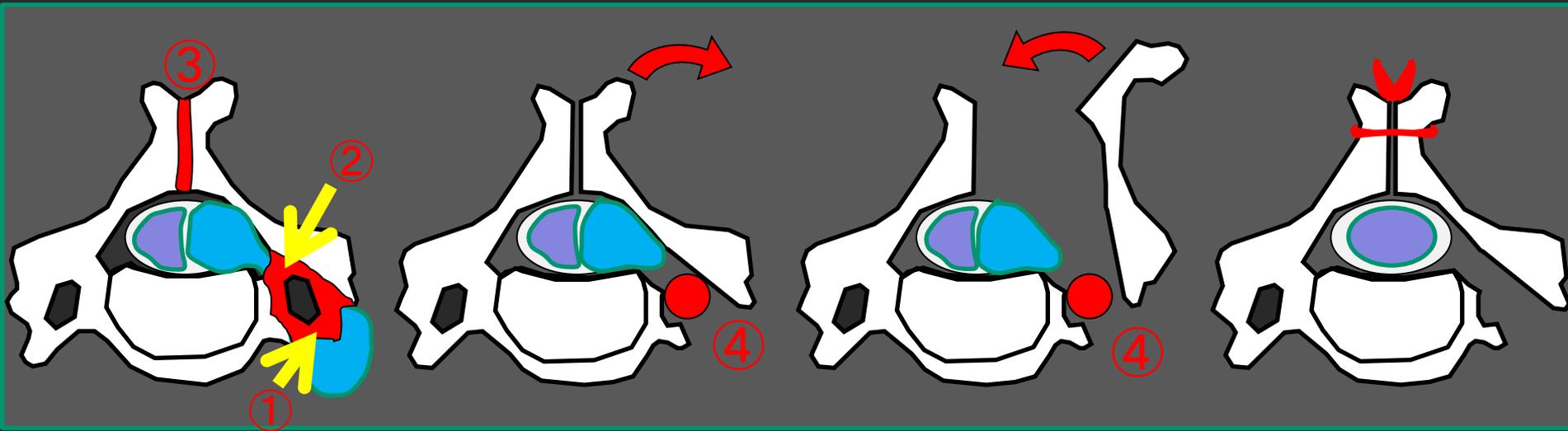
60-year-old female



65-year-old male

*One way approach can injure spinal cord or VA*

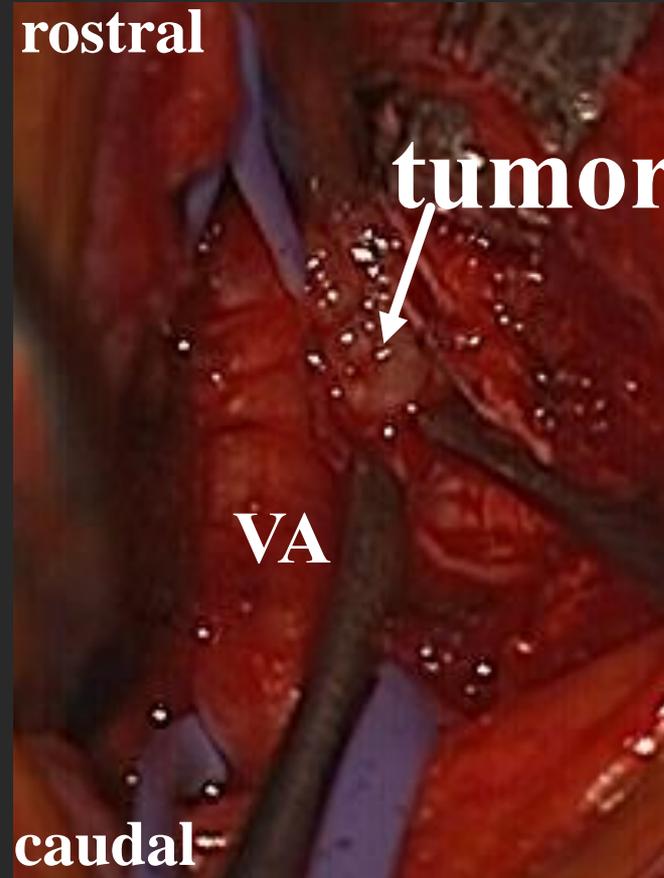
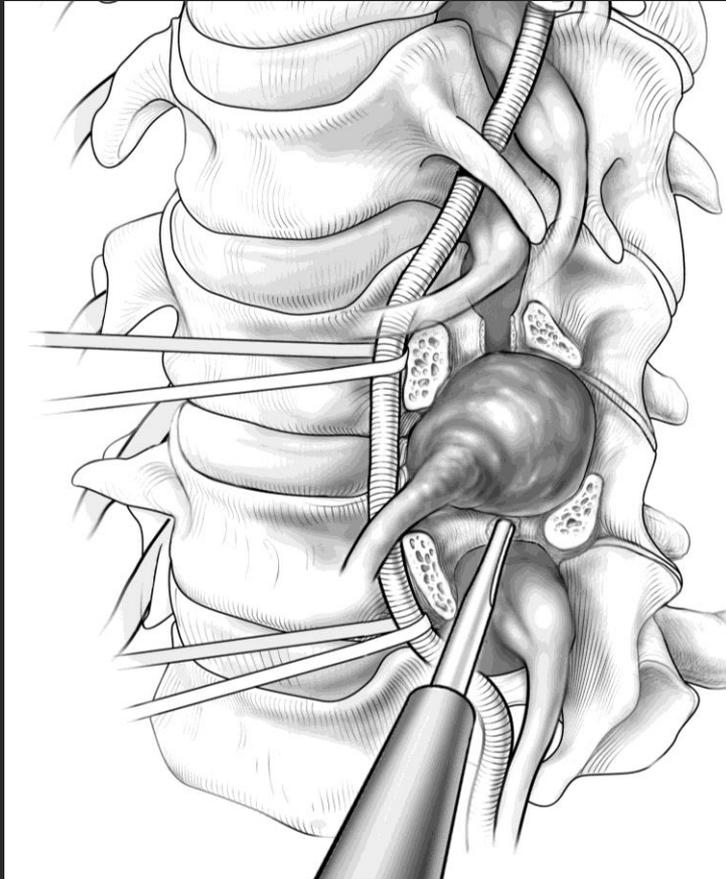
*Combined anterior and posterior approach of P-UPART to excise dumbbell-shaped tumors safely and securely.*



First, by anterior approach, remove the outer wall of the foramen (①) to dislodge the vertebral artery, and then, divide the inner wall of the foramen, the pedicle (②), to make a hinge for the unilateral arch to turn around.

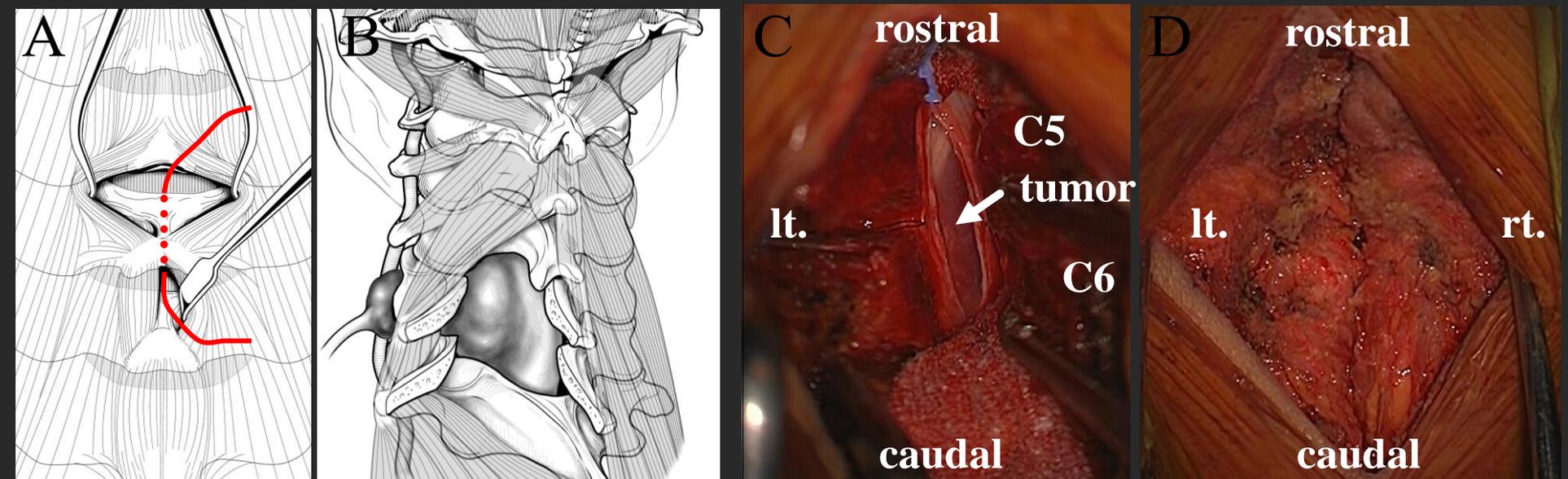
Second, by posterior approach, after splitting the spinous process (③), the unilateral arch can be expanded on the divided pedicle (④), and recapped with stitches after tumorectomy.

# *Anterior approach to excise the anterior lesion with VA in control*



The pedicle is being divided with an ultrasonic osteotome after dislodging VA. Intraoperative photo shows that VA is dislodged and kept in control, and the tumor is safely excised, then division of the pedicle is confirmed by inserting a probe.

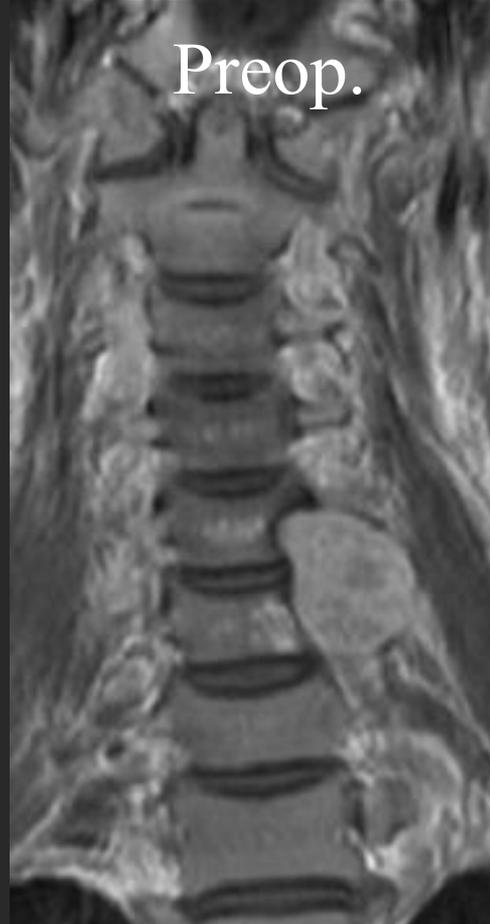
# *Inter-muscular plane posterior approach for P-UPART without damaging the muscles*



First, by spreading the free space between the bilateral interspinalis, a surgical thread wire is passed beneath the lamina after flavectomy and split the spinous process (A). The left unilateral arch is widely expanded on the divided pedicles and the intradural lesion is ready to be removed (B and C). After recapping, the posterior musculature remains almost intact (D).

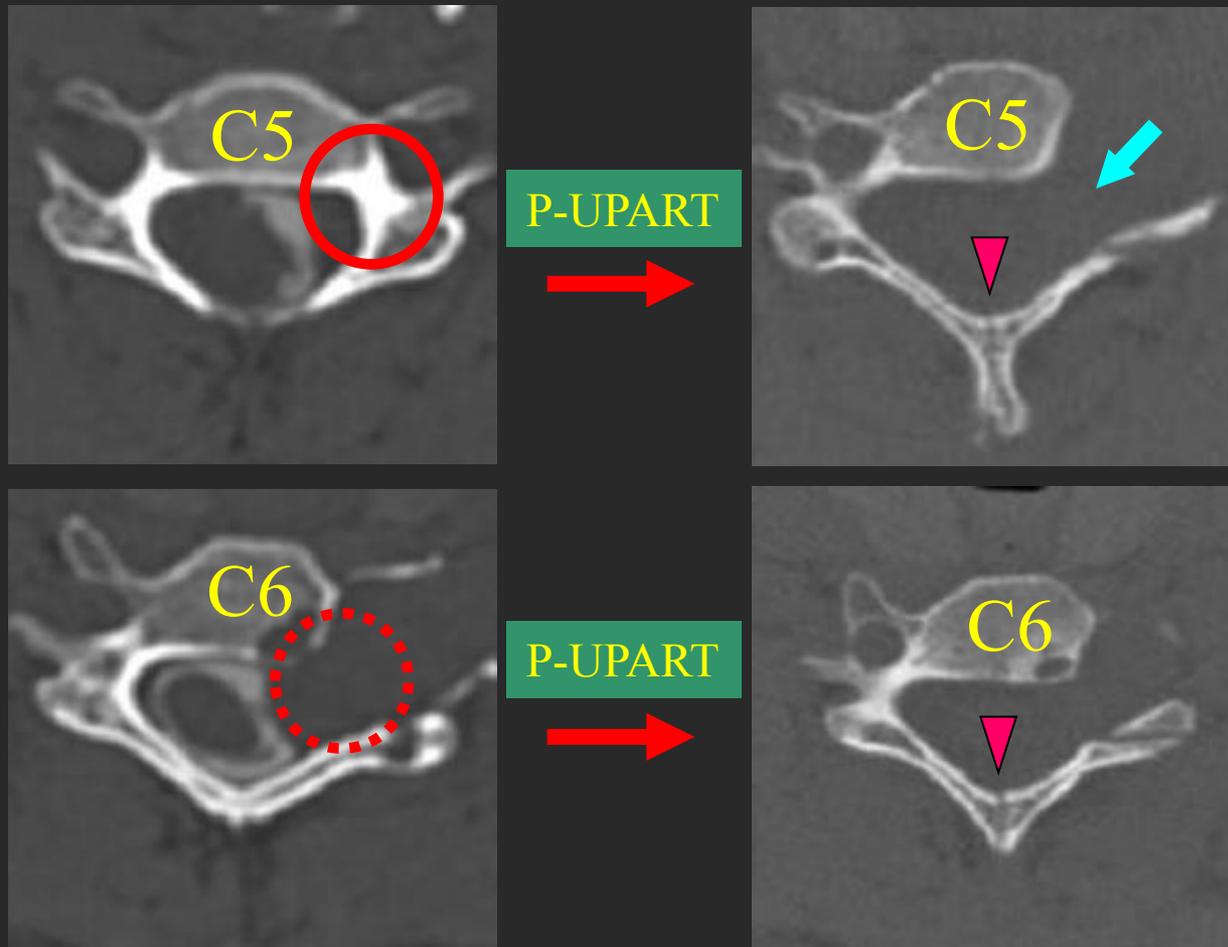
## *Case presentation*

### *A 23-year old female C5/6 left dumbbell neurinoma*



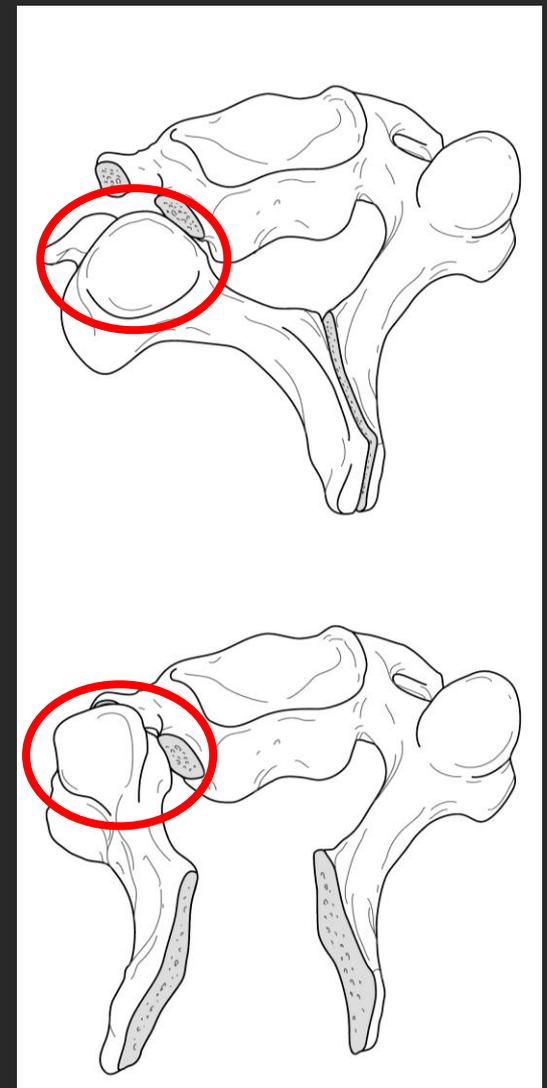
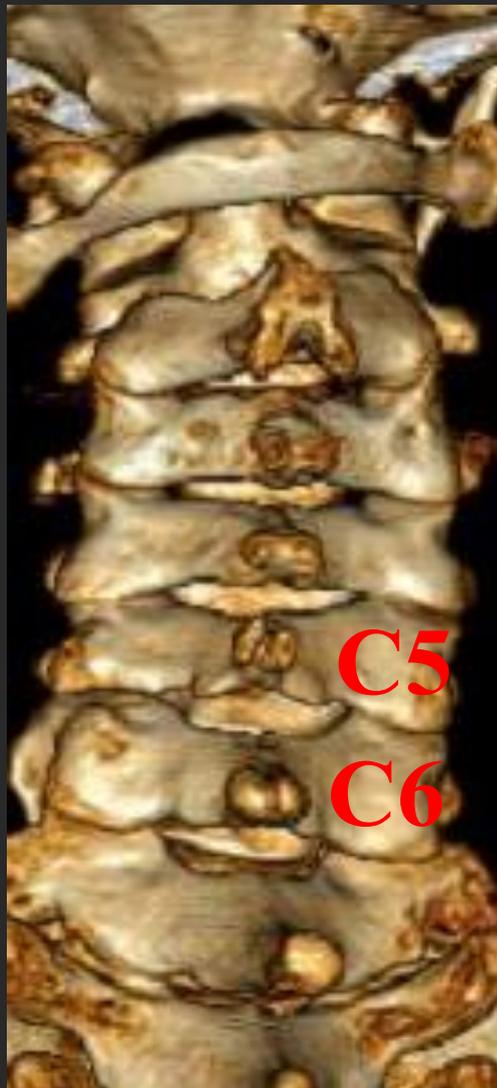
**Gross total resection of the tumor was achieved.**

## *Pre- and postoperative CT*



In this case, the C6 pedicle had been already disappeared due to the tumor growth (dotted red circle) and only C5 pedicle was divided by anterior approach (arrow). Anatomical recapping was so perfect that osteotomy lines in the middle of spinous processes were hardly identified (arrowheads), because completely intact facet joints greatly helped anatomical recapping (next slide).

# *1 month postoperative 3D-CT*



Facet joints remain completely intact,  
which greatly help anatomical recapping.

## *Postoperative coronal MRI*



There was no evidence of muscle damage both in multifidus layer and in semispinalis layer and it was hard to recognize which side was affected.

## *Patient data*

<b>Case</b>	<b>Sex/Age</b>	<b>Tumor</b>	<b>Location-Type</b>
1.	F/65	Neurinoma	C3/4 – Eden 2
2.	M/65	Neurinoma	C6/7 – Eden 2
3.	F/23	Neurinoma	C5/6 – Eden 2
4.	F/68	Neurinoma	C5/6 – Eden 2
5.	M/10	Neurinoma	C2/3 – Eden 2

## *Surgical outcomes*

*Follow-up period 2 mos. ~30 mos.*

1. Mobility and stability were well maintained in plain X rays.
2. No obvious evidence of muscle damage in axial MRI.
3. Anatomical reduction of expanded laminae was confirmed in all cases on CT.
4. No axial pains lasting for more than 2 months postop.
5. Average operating time 394 min. (350 min. ~ 452min.)  
Average blood loss 306 g (105 g ~ 520 g)
6. No neural complication, No persistent CSF leakage

## *Advantages of P-UPART*

- Anatomical land marks were well preserved for safer and less invasive revision surgery.
- The anterior tumor component is safely excised with the VA kept in control.
- The posterior musculature is kept undisturbed and anatomical reduction can be easily obtained with a help from undamaged facet joints .

*no conflict of interest*