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Muscle-sparing unilateral posterior arch recapping techniques for cervical spinal cord tumors in children including dumbbell shaped tumors

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Background: Child's cervical spine is so vulnerable that surgical damage to the vertebrae and deep extensor muscles can produce cervical deformities and/or instability. Such problems would be unavoidable if the surgery extends multilevel or involves C2 level.

Research questions: Can muscle-sparing unilateral posterior arch recapping technique (UPART) and pedicle-hinged UPART (PUPAT) prevent those problems without instrumented fixation.

Design and methods: We retrospectively studied surgical outcomes of a girl aged 13 years with epidural cavernous hemangioma between C3 and C7 and a boy aged 10 with dumbbell schwannoma at C2/3. Both had progressive disabilities. The girl showed kyphosis on preoperative neck X rays. We removed the lesions by UPART for epidural hemangioma and PUPART for dumbbell schwannoma. UPART is performed by dividing unilateral half of laminae and spinous processes without damaging their muscle attachments, then recapping the free laminae with their muscles to the anatomical positions. PUPART is a combined anterior and posterior procedure. From front, the pedicles are divided to make a hinge for laminae to rotate around as the anterior extradural tumor is debulked as much as possible. From behind, the spinous processes are split with their attached muscles undamaged. Unilateral halves of laminae and spinous processes are opened with the divided pedicles as a hinge. For C2 unilateral expansion, we modified PUPART to prevent damage to those joints.

Results: The girl has been followed for 8 years since surgery and the boy followed for 10 years. Both had the lesion totally removed leaving no symptoms without evidence of recurrent tumor on postoperative MRI. On plain X rays, the girl gained normal cervical lordosis with full neck motions through her growth and the boy kept his normal lordosis and motions.

Discussion: These procedures prevented postoperative deformities and instability in the immature cervical spines without a help from instrumented fixation.

Fig. 1

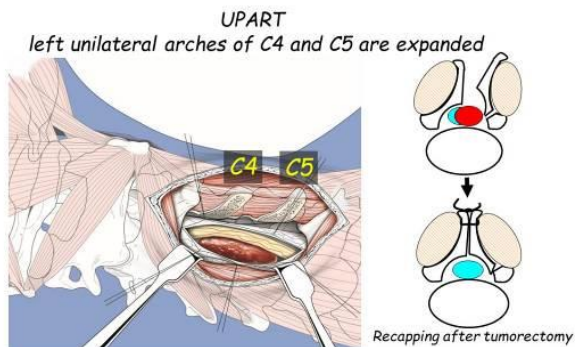


Fig. 2

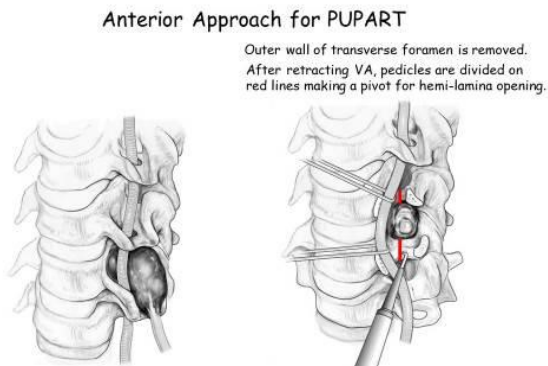


Fig. 3

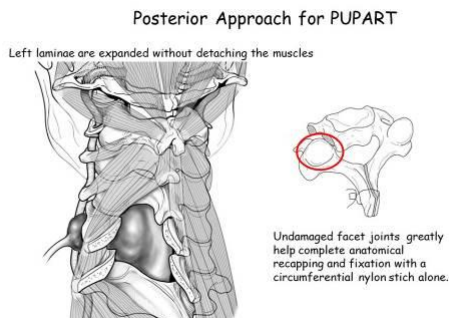


Fig. 4

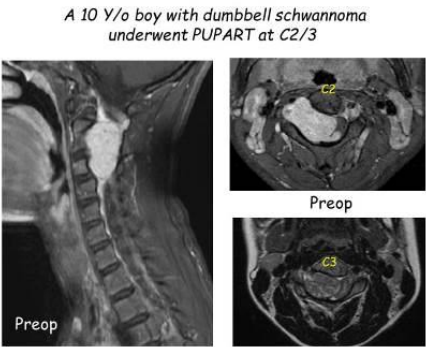


Fig. 5

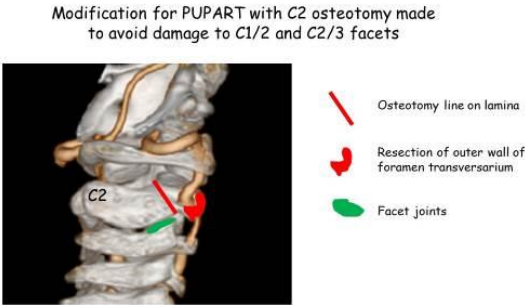


Fig. 6

