

LETTER TO THE EDITOR

Considerations on “Endoscopic endonasal approach to the craniocervical junction: the importance of anterior C1 arch preservation or its reconstruction”*

Considerazioni su “Approccio endoscopico endonasale alla cerniera craniocervicale: il ruolo della preservazione dell’arco anteriore di C1 o della sua ricostruzione”

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Dear Editor, I should like to make some comments of the paper of Re et al.^{*}. The authors report on 10 patients undergoing endoscopic endonasal decompression for different CCJ pathologies. In 8 patients, the authors were able to preserve the anterior C1 arch, while in 2 cases they reconstructed it with clinical improvement or stabilisation and preservation of spinal stability in all without posterior fixation (mean follow-up of 31 months). Four surgical technical topics deserve particular consideration in this paper.

- The assumed superiority of a transnasal approach compared with a transoral approach to the CCJ.
- The dural opening and tumour removal in case of C1-C2 neoplastic lesions.
- The endoscopic pannus removal and subsequent anterior screw fixation by self-tapping screws for a better fracture healing and spinal realignment (only for inveterate C2 Anderson-D’Alonso type II fractures).
- The anterior arch of C1 reconstruction a) by placing bone chips compressed between the bone under endoscopic control and subsequent fixation with three screws and one plate or b) with autologous bone graft and titanium mesh (in a non-union anterior atlas fracture after conservative treatment that developed C1 lateral masses displacement with cranial settling).

Point to point considerations

1) The assumed superiority of a transnasal approach compared with a transoral approach to the CCJ.

The authors comment that “the transoral-transpharyngeal technique, is still considered the gold standard anterior approach and still represents the most experienced technique. However, this surgical technique is not properly minimally invasive since this approach often involves the splitting of structures such as the soft palate, mandible and maxilla”. Otherwise they proudly claim to perform “routinely posterior hard palate outer bone layer drilling in order to make it more

flexible to enhance the angle of “nasopalatine line”. Such a contradictory statement apparently seems to go against the assumed superiority of a transnasal approach over a transoral approach.

In fact, according to our experience, the 30° endoscope has been proposed for the transoral approach to avoid full soft-palate splitting, hard-palate splitting or extended maxillo-mandibulotomy. Using the endoscope, the operator is able to look in all directions by rotating the instrument. Because the light source is at the level of the abnormality, superior illumination can be obtained. With the aid of an endoscope, abnormalities as high as the mid-clivus can be visualised without extensive soft- or hard-palate manipulation¹⁻³.

The authors continue as follows: “...the transoral route is not a straightforward approach to the lesion and could present a deep surgical field with a small and asymmetric angle of working related to the mouth opening and upper direction”; “...the endoscopic endonasal approach is a more direct and straightforward approach with a shorter working distance in comparison with the transoral ones, offering a good exposure and working area from the clivus down to C2”. According to our experimental and clinical experience, an endoscope assisted transoral approach allows better surgical control of the CCJ. It provides better CCJ exposure in sagittal and transverse planes, providing a larger working channel and an easier manoeuvrability (Fig. 1). The transnasal approach is limited in caudal direction down to the NPL, otherwise the transoral approach is limited in the rostral direction with a maximum to the foramen magnum in normal specimen (Fig. 2). In every individual case, the pros and cons of the appropriate approach have to be taken into account as well as the choice of a combined transnasal and transoral approaches strategy⁴.

2) The dural opening

To open the CCJ dura is always a challenge.

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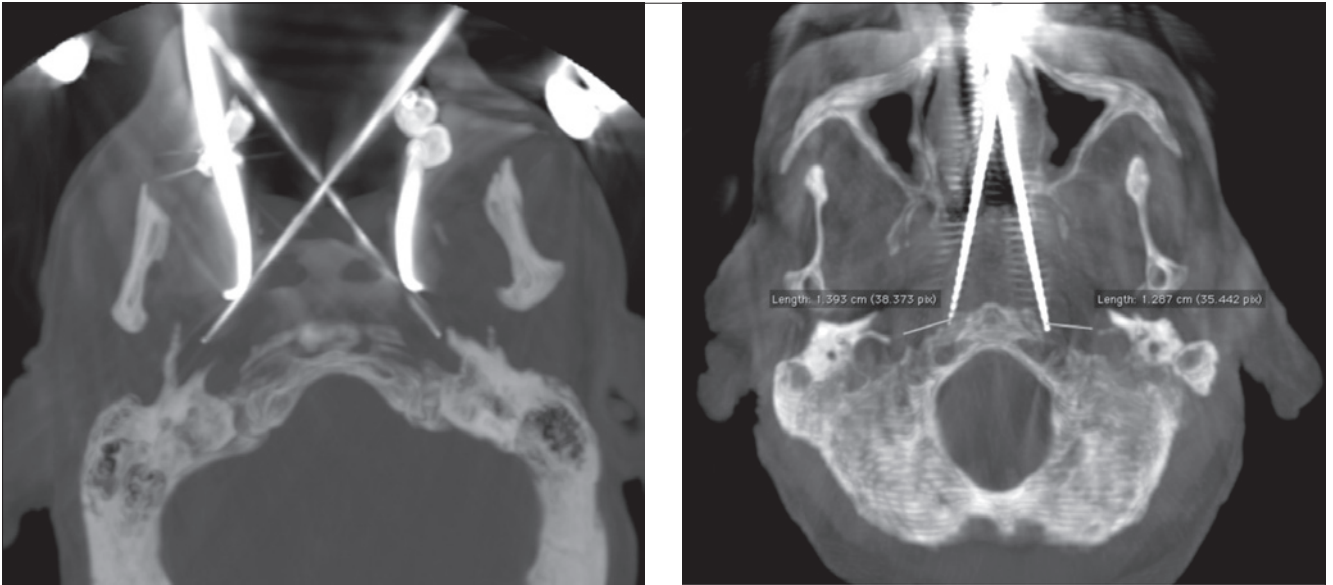


Fig. 1. CT scan axial reconstructions bone window. Lateral coronal surgical domain in a transoral (left) and in transnasal (right) cadaveric specimen using two probes through the oral cavity and nostrils. The transoral surgical span appears wider compared to the transnasal approach.

One of the assumed superiorities of a transnasal approach can be recognised in the authors' statement that "the lower morbidity (of transnasal) can be ascribed to an earlier extubation, prompt oral feeding and lesser risk of bacterial wound contamination, because the mucosal defect created by a transnasal approach is linear, smaller and above the level of the soft palate; on the other hand, the transoral approach..." also include the risk of bacterial contamination secondary to oral cavity penetration, prolonged postoperative intubation and nasogastric tube feeding, along with potential effects on phonation".

In our personal experience, the only case of fatal postoperative meningitis was related to a pure transnasal approach to the CCJ with inconsistent intraoperative dural repair and

subsequent rhinopharyngeal bacterial contamination (unpublished). Thus, it appears inadvisable to open the dura so confidentially in the rhinopharynx since the risk of bacterial contamination is not completely zero as we all should wish for.

3) *The endoscopic pannus removal*

Endoscopic pannus removal and subsequent anterior screw fixation with self-tapping screws appears to be in line with some surgical trends, mainly in the Asiatic literature, which suggests first to release anteriorly and then to stabilise posteriorly in case of "irreducible CCJ compressions"; nevertheless, our experience seems to be innovative⁵. In fact, pre-operative irreducibility of the C1C2 dislocations should not be an absolute indication for trans-oral decompression. An attempt to reduce the dislocation under general anaesthesia and

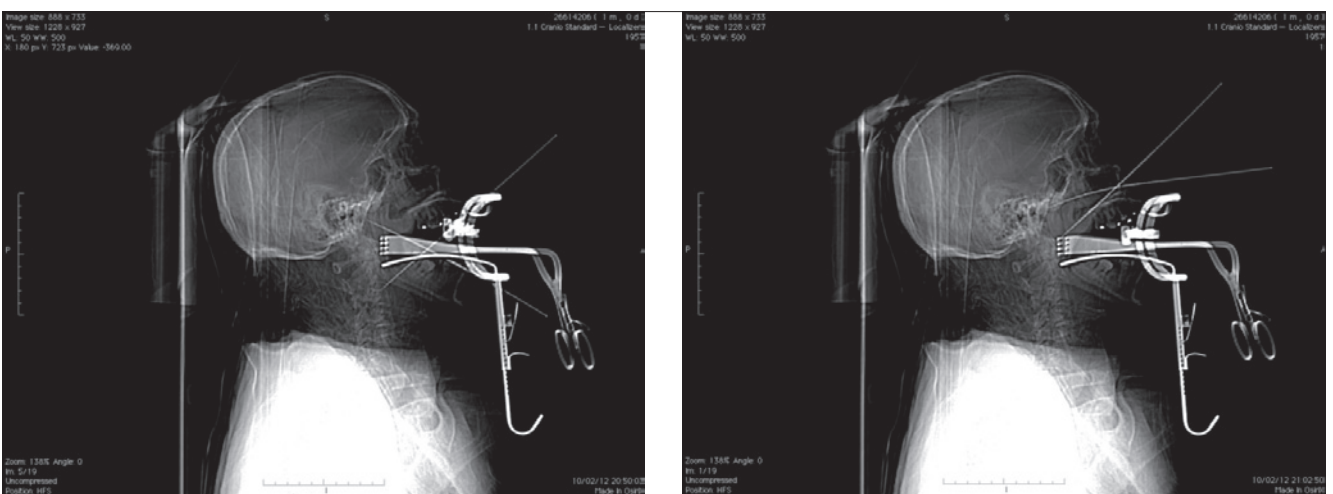


Fig. 2. CT scan sagittal scout view. Sagittal domain in a transoral (left) and in transnasal (right) cadaveric specimen using two probes through the oral cavity and nostrils. The transoral surgical span appears wider compared to the transnasal approach.

during posterior fixation should be made in many conditions. A combination of axial traction with slight extension of the neck on the chest and slight flexion of the head on the neck, although traction only with extension would seem to be more appropriate. In fact, although it may seem to be dangerous, our method helps to reduce C1C2 dislocations better, stretching the ligaments in case of irreducibility and better exposing the local anatomy of the CCJ. Intraoperative neurophysiological monitoring should be considered for these surgical procedures⁵.

4) Anterior arch of C1 reconstruction

Very interestingly the authors report the observation that atlas ring integrity could prevent the C1–C2 subluxation even in cases of transverse ligament disruption, thanks to the important role of second stabilizers (capsular ligaments, paraspinal muscle, tectorial membrane, anterior longitudinal ligament, and ligamentum flavum) that provide a relevant restraint to C1-C2 segment motion^{6,7}. Agrawal et al. in a cadaveric study stated that transoral odontoidectomy and resection of the anterior C1 arch destabilise the atlantoaxial joint and risk its stability. After odontoidectomy and arch removal, angular ROM increases significantly in all directions of loading. C1 arch reconstruction with or without odontoidoplasty restores *only partial angular stability* of the atlantoaxial joint but *provides restoration of the ability of the C1 lateral masses to resist splaying*, often observed as postodontoidectomy cranial settling⁷. Atlas reconstruction by itself does not guarantee stability “without inflammatory process of the synovial capsule and joints, the articulation between C0-C1 and C1-C2 already present some grade of fusion that limits the movement and dislocations” as the authors of the present paper correctly clarify along with the observation that “in some cases the transverse ligament with its attachment to the bone, probably, is almost entirely preserved and we noted after few months a sort of fusion between the residual odontoid process and the posterior border of the C1 arch. Keeping this concept in mind, in the last cases we intentionally fused C1 to the residual C2 dens by screws and bone substitutes in order to enhance future spinal stability”. More surprisingly, in our experience a complete regeneration of the clivus and odontoid after transoral decompression is possible; in fact, besides the need for accurate complete resection of the periosteum, which apparently was incompletely performed in our case, our experience suggests the need for resection of the odontoid down to the dentocentral synchondrosis, and accurate lateral removal of the bone surrounding the anterior tubercle of the clivus is advised when an anterior CVJ decompression is required in children presenting with evident synchondrosis

at neuroradiological investigation⁸. Thus, in conclusion I do not recommend to popularise the non-use of instrumentation systems in such a surgery except in selected cases of spontaneous restorative processes (inflammatory or degenerative) which provide secondary bone fusion⁹⁻¹¹.

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