

# “Nuances of Gamma Knife radiosurgery for upper cervical spine lesions”

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Received: 2 September 2016 / Accepted: 7 September 2016 / Published online: 15 September 2016  
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Dear Sir,

It was a privilege to read comments [1] about our article [2] by such an illustrious group.

As they rightly pointed out, in the upper cervical spine, changing of the gamma angle may not be advisable at all. The maxillary division of the trigeminal nerve mediates the pain during maxillary fixation. Maxillary block may be the ideal anesthetic procedure. However, it is demanding and would have required the involvement of an expert in this block. To circumvent this, we infiltrated the dermis with lignocaine using an insulin syringe. A few minutes later, a longer 23-G needle was used to infiltrate the periosteum and as much of the bone as the needle could penetrate. In our opinion, it would be a simpler procedure than a block with no extra discomfort. Caution is to be kept in mind as the pin should only penetrate the thickest part of the bone to prevent a fracture and an inadvertent entry into the sinus. A bone window CT scan of this part delineates the individual variation in bone thickness and the amount of pneumatization of the maxilla. As highlighted by Tuleasca et al., jaw immobilization would be an invaluable technique for certain extra-cranial lesions.

The Leksell Icon system is definitely an improvement over Perfixion. Equipped with cone beam computed tomography (CBCT), it ensures geographical accuracy with automatic positional delivery correction along similar lines as Cyberknife

radiosurgery but with better precision of 0.1 mm. The biggest argument against GKRS for cervical spine lesions remains the inability to provide absolute immobilization and increased chances of target movement with physiologic activities. The infrared stereoscopic camera-based ‘high-definition motion management system (HDMM)’ facilitates frameless stereotactic radiosurgery with an accuracy of 0.15 mm even with accessory movements. However, the target movement is correlated using nose movement as an approximation. Whether the same reference point is valid for targets in the upper cervical spine before clinical utility needs to be checked further with empirical data.

## Compliance with ethical standards

**Funding** No funding was received for this research.

**Conflict of Interest** All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers’ bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

## Reference

1. Tuleasca C, Broome M, Pascal Mosimann P, Schappacasse L, Zeverino M, Dorenlot A, Champoudry J, Régis J, Levivier M (2016) Jaw immobilization for Gamma Knife surgery in patients with mandibular lesions: a newly, innovative approach. *Stereotact Funct Neurosurg*. doi:10.1159/000449065
2. Tripathi M, Kumar N, Mukherjee KK (2016) Pushing the limits of the Leksell stereotactic frame for spinal lesions up to C3: fixation at the maxilla. *Acta Neurochir (Wien)* 158:1691–1695

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