

Cooled Radiofrequency Ablation of Genicular Nerves for Knee Osteoarthritis Pain: A Letter to Editor

Menno E Sluijter^{1,*} and Alexandre Teixeira²

¹Department of Pain Medicine, Swiss Paraplegic Center, Nottwil, Switzerland

²Clinica de Dor, Porto, Portugal

*Corresponding author: Menno E Sluijter, Department of Pain Medicine, Swiss Paraplegic Center, Nottwil, Switzerland. Tel: +41-419394920, E-mail: msluijter@mac.com

Received 2017 February 22; Accepted 2017 February 22.

Keywords: Pain, Osteoarthritis, Knee, Chronic Pain, Radiofrequency Catheter Ablation

Dear Editor,

We have read the article by Dr Reddy et al (1) with great interest. We agree that the group of patients who do not qualify for a knee prosthesis or simply do not want to be operated deserve more attention so we compliment the authors on their initiative. However, we have some remarks to make that may be useful before they start their controlled study.

Cooled RF is a clever technique that was originally designed for ablating liver metastases. Liver tissue is reasonably homogenous and the large RF current that is generated can easily flow away in all directions without creating risks for surrounding structures. The technique was then taken over to ablate nerves, probably without realizing potential risks. An RF heat lesion produces a current of about 100 mA and disposal of that current is not a problem. A cooled RF lesion however generates a current that is at least 10 times larger and since it is steered on temperature it is very sensitive to variations in convection. If such a current is delivered in a bony area and if larger nerves are not too far away the current may seek an unpredictable way out and this may cause trouble. The first and serious complication of transplanting cooled RF into an unintended environment has now been described (2) and we feel that this is a structural risk of the procedure. It may well happen again sooner or later. Even if the occurrence is very low, we find this not acceptable for a palliative procedure.

Another concern is that wrong conclusions may easily be drawn from this publication. The authors have performed a partial denervation of the knee joint, using a very high RF current. The question then is if the clinical result is a sequence of the denervation or a sequence of the current. We feel that the last option is a distinct possibility.

The immune system has a clear strategy for situations that cannot be completely corrected. The system then puts equilibrium on the first place and the level of that equilibrium on second, because without equilibrium there would

be complete chaos. This happens equally in tumors and in case of inflammation. In the case of an arthritic knee, that means that the immune cells are too tolerant. In many patients the situation is even worse because steroids have been injected, artificially increasing the tolerance.

RF currents have the potential of reactivating tolerant immune cells. We have observed that with pulsed RF treatment of tumor metastases and of infected wounds, 2 other tolerant conditions, and this work will soon be published. These effects need a minimal electric field in the target area of about 100 V/m.

In the described procedure, the current will easily enter into the knee joint. Since there is a lot of bone in the area and no information on the current, the exact fields are difficult to calculate, however, we think that 200 V/m would be a reasonable estimate. This is more than enough to activate phagocytes and to make them do their work. This would then be followed by a vagus nerve initiated anti-inflammatory phase, eventually resulting in reduction of inflammation and pain.

To our opinion this is a very likely explanation of the effect that the authors have observed. If that would be correct, there is no need for an invasive procedure. Transcutaneous PRF is perfectly able to provide the necessary electric fields and it has been proven to be effective in an RCT (3). We have limited experience with knee arthrosis because it is not our main field of interest, however, using a modified and very simple technique our patients are happy and so are we, because they need few "reminder treatments".

Times are changing, and we feel that in this case it is a good thing. We cannot kill every tumor cell and we cannot block every nociceptive stimulus from an inflamed area. The body must do that by itself. The oncologists have understood that and immunotherapy is developing fast. We feel that pain doctors should follow this trend the sooner the better. We wrote this letter not out of criticism but as an incentive to reconsider.

References

1. Reddy RD, McCormick ZL, Marshall B, Mattie R, Walega DR. Cooled radiofrequency ablation of genicular nerves for knee osteoarthritis pain: A protocol for patient selection and case series. *Anesth Pain Med.* 2016;**6**(6):39696. doi: [10.5812/aapm.39696](https://doi.org/10.5812/aapm.39696).
2. Gooding I, Voogd E, Sigmon C. Femoral nerve injury following cooled radiofrequency lesioning for the treatment of hip pain despite ultrasound guidance and motor testing. *Pain Pract.* 2016;**16**(S1):147.
3. Taverner MG, Ward TL, Loughnan TE. Transcutaneous pulsed radiofrequency treatment in patients with painful knee awaiting total knee joint replacement. *Clin J Pain.* 2010;**26**(5):429–32. doi: [10.1097/AJP.0b013e3181d92a87](https://doi.org/10.1097/AJP.0b013e3181d92a87). [PubMed: [20473051](https://pubmed.ncbi.nlm.nih.gov/20473051/)].