



# Femoral Nerve Injury Following Cooled Radiofrequency Lesioning For the Treatment of Hip Pain Despite Ultrasound Guidance and Motor Testing

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## Background

Percutaneous radiofrequency ablation (RFA) of the articular branches of the obturator and femoral nerves can be an effective method for treating hip pain. No major neurovascular complications have been reported using this technique. In Cooled RFA, the temperature of the probe is reduced with circulating water, allowing for more energy use, and creation of a larger burn lesion. The larger burn area is purported to better account for the variability in the anatomic location of the target nerves and increase the efficacy of the procedure. We present a case where despite the use of recommended safety measures cooled radiofrequency lesioning at the hip resulted in severe femoral nerve injury and quadriceps paralysis.

## Burn Area

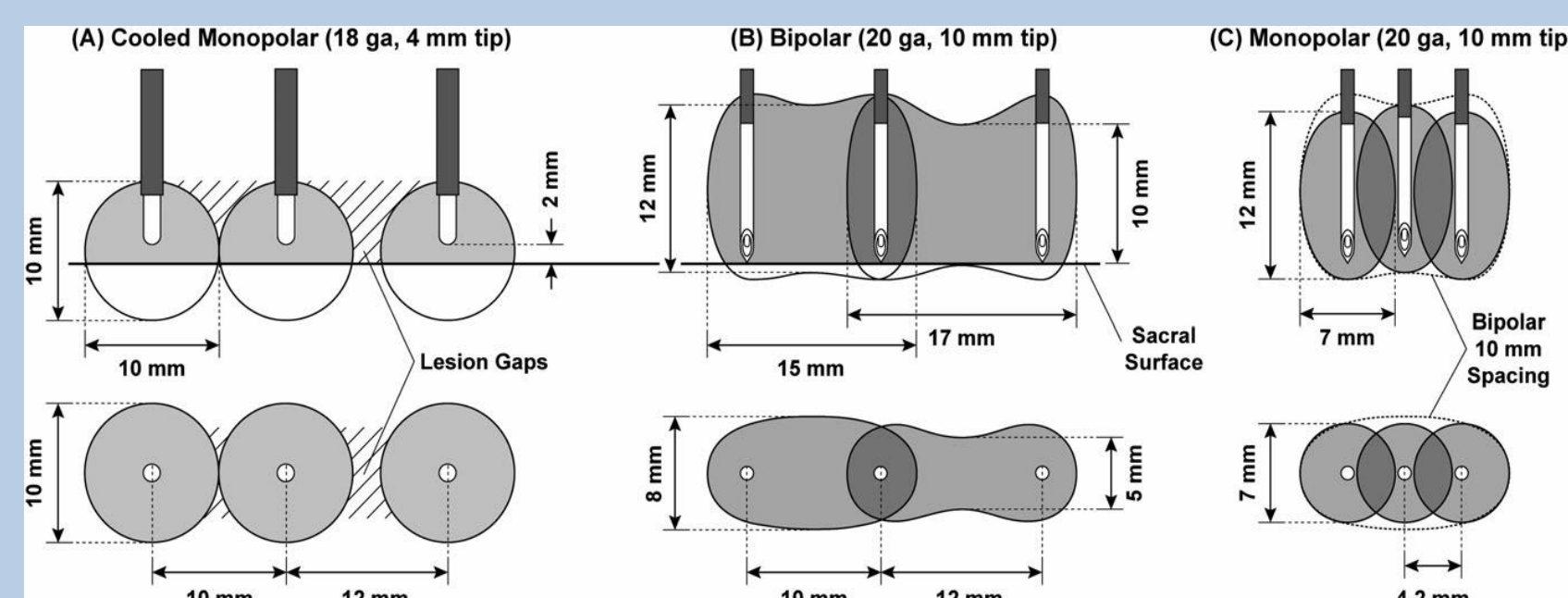


Figure 1: Cosman and Gonzalez. Geometry of cooled and traditional RFA. Spherical vs elliptical lesion shape.

## Case Report

- This is a 25 y/o female who presented with chronic right hip pain secondary to Femoroacetabular impingement syndrome
- No other significant PMH
- She underwent hip arthroscopy one year previously which improved but did not eliminate her pain
- Pain continued despite extensive post op physical therapy, chiropractic treatment, and acupuncture.
- Medications: PRN NSAIDS
- PE: BMI 19, 5'8", 117lbs. No focal neuro deficits.
- Following effective diagnostic blocks of the intended nerves, Cooled RFA was performed.

## Procedure

Safety measures employed

- Ultrasound imaging to locate neurovascular structures, marking 1cm wide margins on the skin.
- A lateral approach to pass under the neurovascular bundle
- Motor testing to 2V at 2Hz without evidence of motor stimulation

Despite the safety measures employed, she developed quadriceps weakness immediately following the procedure with numbness along the femoral and saphenous nerve distribution.

## Treatment Course

- These symptoms persisted and physical exam 3 days later revealed 0/5 right knee extension
- EMG performed at 6 weeks demonstrated no voluntary motor unit action potentials consistent with severe femoral neuropathy.
- No significant functional recovery over several months of physical therapy, gait training, and external muscle stimulation.
- Referred to Neurosurgery – nerve transfer vs grafting is planned.



Figure 2: MRI demonstrating enlarged femoral nerve with diffuse hyperintense signal on T2-weighted images

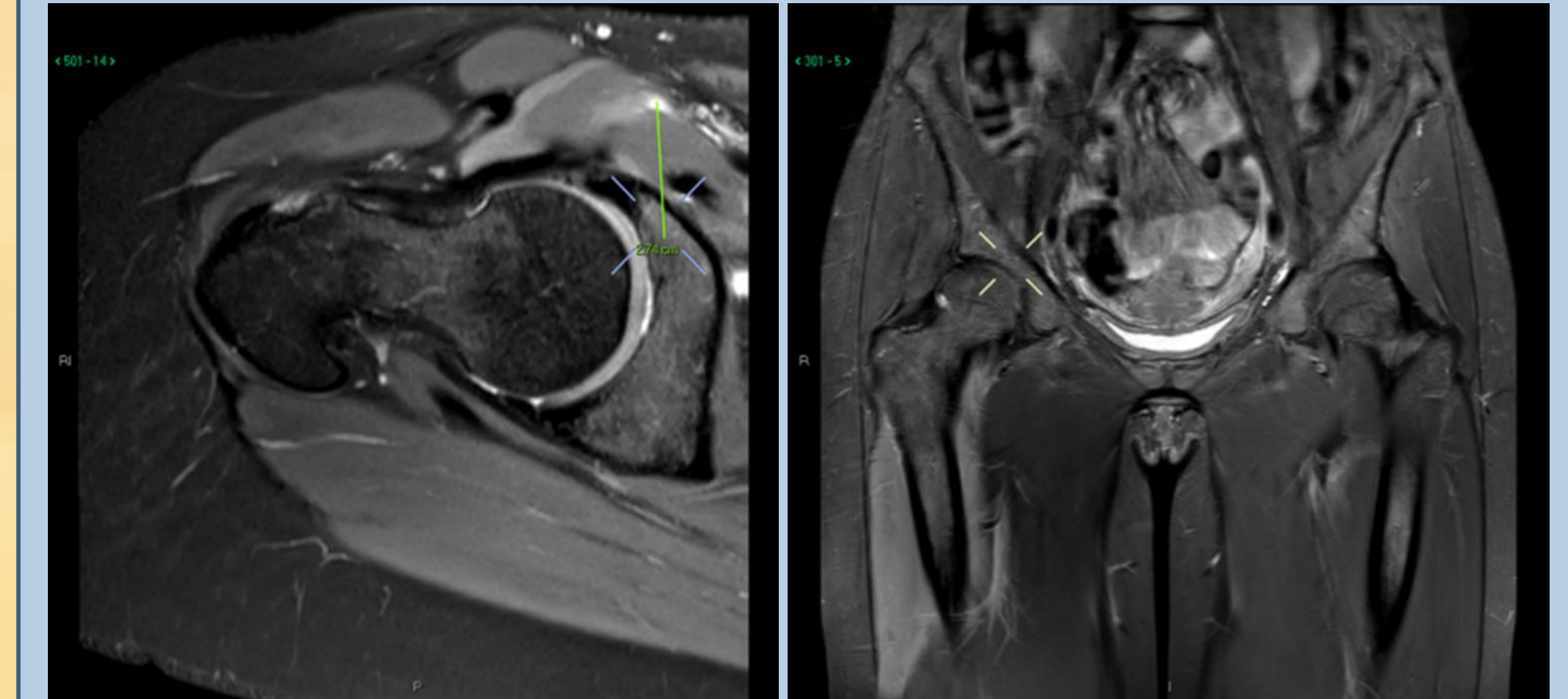


Figure 3: Estimated distance from RFA target and the femoral nerve

## Discussion

Various strategies have been described to minimize the risk of injuring the femoral nerve when performing hip RFA including a predetermined lateral angle of entry, the use of ultrasound to visualize the neurovascular bundle, and motor testing prior to treatment. In this case all of these measures were used, but nerve injury still occurred bringing in to question the safety of cooled RF lesioning for hip pain. Exactly how the injury occurred is unclear, but with cooled RF it may be that the burn size extends beyond the area tested with motor stimulation providing a false reassurance of safety. Normal saline injection prior to RFA has been demonstrated to increase lesion size. The relatively large 3ml volume of pre treatment local anesthetic used in this case may have increased the RF burn area. Another contributing factor in this case was patient size. With a BMI of 19 we speculate there was less protective tissue separating the treatment site from the femoral nerve than would be present in a larger individual. Measures to minimize risk in the future when performing RFA for hip pain include verifying final needle position with ultrasound prior to treatment, limiting local anesthetic volume, and considering pulsed or traditional RFA in patients with low BMI's

## References

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