

# Editorial Commentary: Hip Cam Overresection May Result in Inferior Outcomes: The Goldilocks Paradox of Too Little, Too Much, or Just Right?



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**Abstract:** Femoroacetabular impingement is a recognized source of hip pain and cause of labral and articular cartilage injury. Persistent femoroacetabular impingement has been recognized as a source of inferior patient-reported outcomes, and attempts to define a “normal”  $\alpha$ -angle has resulted in more aggressive resection of cam lesions. An overzealous femoroplasty may result in iatrogenic hip instability. A dynamic intraoperative examination may be the best way to truly recognize this problem, in particular, by visualizing the loss of the suction seal, as the cam resection engages the acetabulum, resulting in subluxation. A soft tissue “remplissage” salvage procedure may offer an option to correct cam overresection and improve patient outcomes during revision arthroscopy, as we continue to search for the “right” amount of cam correction to perform.

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Over the past several decades, the hypothesis of femoroacetabular impingement (FAI) as a source of hip pain and potential cause of osteoarthritis has been solidly confirmed. Initially, much of the research in hip preservation through arthroscopic intervention has focused on the fundamentals of recreating the suction seal of the labrum and avoiding under resection the cam lesion. Now, as labral repair and reconstruction techniques have been refined to achieve success on the acetabular side, our attention is shifting to the femoral side. This has led to a vibrant discussion about how to address the cam lesion, and it is increasingly being recognized that cam overresection may result in inferior outcomes.

Arthroscopic techniques have allowed us to create a less invasive option for hip preservation, but not without risk: iatrogenic cartilage damage, neurovascular injuries, heterotopic ossification, deep venous thrombosis, and iatrogenic instability to name a few.<sup>1</sup> Instability, whether macroscale or more subtle microscale, has increasingly been recognized as a source of persistent patient

symptoms and “failures” after FAI correction.<sup>2</sup> An overzealous femoroplasty may result in such symptomatic instability. Ng et al. reported in a cadaveric study that cam resection increased hip microinstability by 31% at 90° of flexion.<sup>3</sup> As the total number of procedures for FAI correction continue to increase, it is likely we will see an increase in such complications.

For years, the mantra of labral repair surgery was to ensure the underlying FAI was corrected to achieve successful outcomes for the patient. Uncorrected FAI was cited as the top reason for failure, and most often, it was found during revision surgery.<sup>4-6</sup> Preoperative and intraoperative planning and imaging techniques have evolved in an attempt to ensure the most adequate resection of cam lesions that could be missed with conventional imaging.<sup>7-9</sup> Additionally, recent data suggest that patients with  $\alpha$ -angles above 55° may incur increased cartilage damage and reduced long-term survivorship. Additionally, they are less likely to achieve minimal clinically important difference (or MCID) or patient-acceptable symptom state (or PASS).<sup>10</sup> Resecting cam deformities is purported to normalize articular cartilage stress and theoretically reduce the progression of osteoarthritis.<sup>11,12</sup> Although parameters for “normal”  $\alpha$ -angle measurements have been developed, each patient may not need to be corrected to that number.<sup>13</sup> Furthermore, even with great visualization and fluoroscopic confirmation, it can still be difficult to

The author reports no conflicts of interest in the authorship and publication of this article. Full ICMJE author disclosure forms are available for this article online, as [supplementary material](#).

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0749-8063/21887/\$36.00

<https://doi.org/10.1016/j.arthro.2021.06.010>

accurately judge the adequacy of cam resection. But must we resect every cam to a standard  $\alpha$ -angle? Mansor et al.<sup>13</sup> suggested that cam underresection may lead to better patient-reported outcomes (PROs). Tjong et al.<sup>14</sup> found good outcomes in patients undergoing acetabuloplasty and labral repair without addressing the cam lesion in combined-pattern FAI. The enigma of these data is anecdotally confirmed when evaluating patients who have similar degrees of FAI with labral tears in both hips, but only one hip is symptomatic requiring treatment. Confused yet? You should be.

Evaluating patients with pain after hip arthroscopy requires a thorough history and a physical to rule out many potential sources of pain and hip dysfunction. Some diagnoses may be more obvious than others, and treatments such as revision FAI correction, capsular reconstruction, and labral reconstruction have all been described. Although cam overresection has been recognized as a potential source of failure of arthroscopic correction of FAI, it may be a more difficult entity to recognize and treat, as there are not always hallmark complaints or obvious imaging findings. The microinstability associated with cam overresection is difficult to assess, as patient complaints may be vague but it can include pain or instability, particularly in flexion angles at 90° and above. Although preoperative imaging, including three-dimensional reconstruction CT scans, may offer a static assessment of the situation, only obvious “shark bite” resections may lead one to think about cam overresection. Mansor et al.<sup>13</sup> suggested that >5% of femoral head resection led to significantly inferior outcomes in a cohort of patients undergoing revision surgery, offering some degree of objective measurements that one can use in radiographic imaging. However, a dynamic intraoperative exam may be the best way to truly recognize this problem, in particular, by visualizing the loss of the suction seal as the cam resection engages the acetabulum, resulting in instability.<sup>15</sup>

Once recognized, the question becomes how to treat it. It's obviously easier to resect a little more bone than to replace it. Bone grafting provides an option for filling such a defect, but it may require more waiting time for the patient and preoperative planning. In their case series, “Salvage Revision Hip Arthroscopy, Including Remplissage, Improves Patient-Reported Outcomes After Cam Overresection,”<sup>15</sup> authors Arner, Ruzbarsky, Briggs, and Philippon describe the outcomes of a novel soft tissue procedure to reduce hip instability associated with cam overresection. “Remplissage” translates to “filling”, and that is what this procedure proposes to do: fill the defect to recreate the suction seal of the hip joint. The soft tissue graft in this case allows flexibility for an intraoperative decision by the surgeon after dynamic examination confirms this complex and very difficult problem. This technically challenging procedure may

augment other interventions to restore stability to the femoroacetabular articulation during revision procedures. Future biomechanical analysis of the soft tissue graft's ability to reduce instability caused by the cam overresection will be helpful to assess whether this technique is truly accomplishing its goal of restoring the suction seal.

Although outcomes were generally favorable in this study (only one conversion to total hip arthroplasty), this group had many other concomitant procedures (such as labral reconstruction/augmentation or capsular reconstruction) performed that may have also contributed to their improved hip stability and PROs. It will be interesting to assess the durability of this soft tissue graft in longer-term outcomes, both based on PROs and perhaps assessed by MRI analysis. Hopefully, as our understanding of the “ideal” degree of cam resection continues to evolve, the need for such salvage procedures will not increase, but this study series does present a potentially viable option to address instability associated with cam overresection in short-term follow-up. More importantly, it certainly serves as a reminder to be thoughtful and careful about cam correction and diligent about our surgical techniques during the primary procedure. Obviously, we are still on the upslope of the learning curve regarding FAI and finding out how much cam deformity to resect is “just right”.

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