



# Femoroacetabular impingement following an osteotomy for acetabular dysplasia: a commentary on a recently published study

Alexander H. Jinnah<sup>1</sup>, Riyaz H. Jinnah<sup>1,2</sup>

<sup>1</sup>Wake Forest School of Medicine, Department of Orthopaedic Surgery, Medical Center Blvd, Winston Salem, NC, USA; <sup>2</sup>Southeastern Regional Medical Center, Department of Orthopaedic Surgery, Lumberton, NC, USA

Correspondence to: Alexander H. Jinnah, MD. Department of Orthopaedic Surgery, Wake Forest School of Medicine, Winston-Salem, NC 27157, USA. Email: [ajinnah@wakehealth.edu](mailto:ajinnah@wakehealth.edu).

Comment on: Castañeda P, Vidal-Ruiz C, Méndez A, *et al.* How Often Does Femoroacetabular Impingement Occur After an Innominate Osteotomy for Acetabular Dysplasia? *Clin Orthop Relat Res* 2016;474:1209-15.

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Acetabular dysplasia (AD) is a common cause of hip pain in adolescents. Furthermore, compared to a normally shaped acetabulum, AD results in increased contact stresses due to the smaller weight bearing surface (1). These increased contact stresses are thought to contribute to damage to the labrum and cartilage, thus, increasing the chance of developing osteoarthritis later in life (1-3). In order to prevent this long term sequela, osteotomies have been used to treat AD (4). Two of these osteotomies include the Salter (5) innominate osteotomy and the Pemberton (6) pericapsular osteotomy (7,8). The Salter osteotomy consists of stabilizing the reduced hip in the position of function by averting the acetabulum, whereas, the pericapsular osteotomy involves reshaping the dysplastic acetabulum. These two procedures have demonstrated good long-term results (8); however, there is the potential for overcorrection leading to iatrogenic pincer femoroacetabular impingement (FAI). With the development of FAI, some have proposed that this will lead to compression and shear stresses between the labrum and the cartilage, eventually also leading to articular degeneration and ultimately global hip OA (1). This question outlines the importance in publishing mid to long-term results following osteotomies to treat AD.

Castaneda *et al.* (3) recently published a retrospective review of their findings in patients with AD treated with either a Salter or Pemberton osteotomy. Very few studies have investigated this relationship, thus outlining the importance of these results. The authors found that FAI was present in 12% (18/154) of their AD patients following

innominate osteotomy treatment at a mean follow-up time of 12 years (minimum 10 years). The criteria used to determine if a patient had FAI included radiographic and clinical outcomes. Forty-two patients met the radiographic criteria put forth (center edge angle  $>40^\circ$ , and a positive crossover sign); however, only 18 of these patients exhibited groin pain on flexion of the hip below  $90^\circ$  and rotation of less than  $15^\circ$ . It was found that FAI occurred nearly twice as often when the correction in acetabular index exceeded 20, thus outlining the importance of avoiding overcorrection when treating AD with an innominate osteotomy.

Kobayashi *et al.* (7) recently performed a similar investigation to identify if Salter osteotomies predispose patients to acetabular retroversion in adulthood. Interestingly, the authors found that patients were no more likely to have a positive crossover sign (acetabular retroversion) in the surgically treated hip when compared to their contralateral one. A peculiar finding that may explain some of the disparity between Kobayashi and Castaneda's difference in FAI incidence is that 80% of the patients who had a crossover sign on the operative hip also had it present on their unaffected contralateral hip. This suggests that acetabular retroversion may be present and have a minimal relationship to the osteotomy procedure, thus, outlining that despite their being an increased chance of acetabular retroversion following osteotomy, the risk is relatively low. Accordingly, Robb *et al.* (9) investigated the presence of acetabular retroversion following a Salter osteotomy at an average of 20 years after the index procedure. The authors found that 12%

(2/17) had radiographic evidence of acetabular retroversion and that none of these patients exhibited clinical signs of impingement.

Despite the promising results seen in the aforementioned investigations, it is important to note that this is still an area of controversy. Ziebarth *et al.* (10) retrospectively reviewed 46 Bernese periacetabular osteotomies focusing on determining the pre and postoperative presence of FAI. The Bernese periacetabular osteotomy is a different technique than the Salter and Pemberton, however, with the same general principles being used. The authors found a high rate of postoperative FAI (22/46); however, it is important to note that minimum follow-up in these patients was only 12 months and the average age of the patient at the time of surgery was 23.5 years. Furthermore, only 3 patients developed FAI following the osteotomy, with 19 of these patients having positive impingement pre-operatively. Similarly, Akiyama *et al.* (11) found a high rate (37.5%) of acetabular retroversion following Pemberton osteotomy. The authors noted that the rate of acetabular retroversion was higher with increased change in the acetabular index and when the osteotomy was performed in older children (>8 years). This, in combination with the lack of association with clinical outcomes, may explain the high rate of acetabular retroversion observed.

The results of the recently published work by Castaneda (3) suggest that innominate Salter osteotomies and periacetabular Pemberton osteotomies to treat AD is a relatively successful procedure. The authors caution limiting correction to a change in acetabular index of no more than 20° when performing this procedure due to the increased rate of FAI observed when this threshold is passed. The investigation put forth by Castaneda *et al.* (3) adds valuable information to the literature about the incidence of FAI following osteotomies to treat AD. However; it is important to note that this remains a controversial topic, and requires prospective investigations with sufficient power to make definitive recommendations in the future.

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