



# An alternative radiographic measure for lateral impingement in FAI

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- assess the standard, weight-bearing AP pelvic radiographs of the patients with hip pain to characterize FAI in chongqing local Chinese population
- identify underlying sensitive radiographic measures for lateral impingement of Cam-type FAI







## All anteroposterior pelvic radiographs of outpatients visiting the TMMU Southwest Hospital Medical Imaging Centre

## Enrolled by :

The eligible patients exhibited unilateral hip and groin pain and no typical feature of osteoarthritis or other deformity on anteroposterior pelvic radiographs

## Excluded by :

epiphyseal non-union, previous history of hip operation or trauma, known history of rheumatoid arthritis or ankylosing spondylitis, a center-edge angel of  $\leq 20^{\circ}$ , or a hip articular space of  $\leq 2$  mm.



## The radiographic measurements were assigned to a senior radiologist who used the Digimizer Image Analysis Software 3.4.1.0 (MedCalc Software, Mariakerke, Belgium)

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	^ Measurem	Area	Perime	Length	Angle	Radius	Unit
	Circle	3.15	6.30			1.00	u
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Contraction of the second s	Tool	Measure	n	Mean	SD	Min	Max
	Angle	Angle	1	45.252		45.252	45.252
and the second	Perpendicul	Length	2	0.742	0.162	0.627	0.856
		Angle	2	39.865	2.307	38.234	41.496
	Circle	Area	1	3.155		3.155	3.155
And a second		Perimeter	1	6.296		6.296	6.296
		Radius	1	1.002		1.002	1.002
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## Radial height/radius (R1) 1/2 radial height/radius (R2)

height/radius



Measurements of the radial height/radius ratio (R1) and 1/2 radial height/radius ratio (R2) on an anteroposterior pelvic radiograph





## Radiographic diagnostic criteria of FAI

- (a) Lateral impingement (cam) : AP- $\alpha$  of >83° in males or ; >57° in females
- (b) pincer-type FAI : positive crossover sign
- (c) mixed-type FAI meeting the criteria of both cam- and pincer-type FAI





### ASSOCIATION OF FAI WITH HIP PAIN BY GENDER AND SITE OF INVOLVEMENT (N = 269)



**TABLE I -** ASSOCIATION OF FEMOROACETABULAR IMPINGEMENT (FAI) WITH HIP PAIN BY GENDER AND SITE OF IN-VOLVEMENT (N = 269)

	Male (n = 121)	Female (n = 148)	Left hip involved (n = 165)	Right hip involved (n = 104)
Painful FAI (n = 38)	23 (19.0%)	15 (10.1%)	21 (12.7%)	17 (16.3%)
Non-painful FAI (n =7)	3 (2.5%)	4 (2.7%)	2 (1.9%)	5 (3.0%)

#### TABLE II - ASSOCIATION OF FEMOROACETABULAR IMPINGEMENT FAI WITH HIP PAIN BY GENDER (N = 269)

	Condor	F	AI
	Gender	Positive	Negative
Painful hips	Male (n = 121)	23 (19.0%)	98 (81.0%)
(n = 269)	Female (n = 148)	15 (10.1%)	133 (89.9%)
Non-painful hips (n = 269)	Male (n =121)	3 (2.5%)	118 (97.5%)
	Female (n = 148)	4 (2.7%)	144 (97.3%)

FAI in painful hips (14.1%) was higher than non-painful hips (2.6%) male had a higher incidence of FAI than female





**TABLE III -** ASSOCIATION OF FEMOROACETABULAR IMPINGEMENT (FAI) WITH HIP PAIN BY SITE OF COMPLAINT (N = 269)

	Site of Complaint	FAI		
		Positive	Negative	
Painful hips	Left (n = 165)	21 (12.7%)	144 (87.3%)	
(n = 269)	Right (n = 104)	17 (16.3%)	87 (83.7%)	
Non-painful hips	Left (n =104)	2 (1.9%)	102 (98.1%)	
(n = 269)	Right (n = 165)	5 (3.0%)	160 (97.0%)	

TABLE IV - ASSOCIATION OF FEMOROACETABULAR IMPINGEMENT (FAI) WITH AGE BY GENDER AND FAI SUBTYPE IN PATIENTS WITH PAINFUL FAI (N = 38)

Age group (years)	Gender	FAI		
		Cam-type	Pincer-type	Mixed-type
<30	Male (n = 7)	5 (71.4%)	1 (14.396)	1 (14.3%)
n = 12)	Female (n = 5)	2 (40.0%)	2 (40.096)	1 (20.0%)
30	Male (n =16)	13 (81.3%)	1 (6.3%)	2 (1.3%)
n = 26)	Fernale (n = 10)	5 (50.0%)	2 (20.0%)	3 (30.0%)

Similar distribution of FAI in different age and gender group



## COMPARISON OF AP-α, R1, AND R2 IN CAM FAI AND



#### NON-CAM-TYPE FAI BY GENDER

gender	Measures	cam-type	non-cam-type	t-value	<i>P-</i> value
	AP-α	96.7° (5.1)	50.2° (7.8)	28.058	0.000
Male R1 (n = 121) R2	R1	0.683 (0.041)	0.689 (0.045)	0.611	0.542
	R2	0.983 (0.039)	0.801 (0.035)	25.533	0.000
	AP-α	87.7° (11.4)°	43.5° (5.0)	29.761	0.000
Female (n = 148)	R1	0.696 (0.030)	0.681 (0.041)	1.372	0.171
	R2	0.988 (0.035)	0.806 (0.038)	17.510	0.000

AP-α differed significantly between the two subgroups in both males and females .R1 was similar between the two subgroups in either gender .whereas R2 differed significantly between the two subgroups



A) in males B) females x1\* = 0.887 as the cut-off limit for males x2\* = 0.899 as the cut-off limit for females







- Both male and female in our series had frequently had FAI at the site of symptoms, different from Gosvig`study. FAI may be an underestimated cause of hip pain
- Assessment of R1 and R2 on anteroposterior pelvic X-ray is easier to do, and allowed detection of lateral impingement
- R2 was in good agreement with angle α on the AP view and it could be used as an alternative radiographic measure to differentiate cam-type FAI from non-cam-type FAI