What is The Scaphoid view ?

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ABSTRACT

Introduction. More than 60% of wrist injuries are associated with scaphoid bone fractures in young active people. Scaphoid fracture difficult to diagnose on initial radiography due to unique and complex structures of scaphoid bone, its overlapping position between other carpals bone and still no general consensus about how and which radiographic view should be taken for better expose. This let scaphoid fracture into potential complication such as non-union, delayed union, decrease of wrist joint motion, osteoarthritis of radiocarpal joint and avascular necrosis.

Materials and Methods. Serial initial projection of radiograph was investigated to get the better view of scaphoid bone. Postero-anterior projection within wrist joint in extension 10°, 15°, and 20° with maximum ulnar deviation using wrist joint frame was found making the scaphoid clearer. The database was compared to get the ideal view of scaphoid. Extension and ulnar deviation were performed due to flexed position of scaphoid anatomically in neutral wrist joint position.

Results. Good exposure of scaphoid is got from performing radiographic examination of wrist joint 10° extended with maximum ulnar deviation position, in a total of 60 right and left wrist joint samples of young active men and women.

Conclusions. Ten degrees extension with ulnar deviation wrist joint position can be proposed to be one of standard scaphoid view on plain radiography. It is useful to assess suspicious or occult scaphoid fracture, besides neutral posteroanterior, lateral and oblique view.

Keywords: extension, ulnar deviation, scaphoid view

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Apa itu *Scaphoid View?*

ABSTRAK

Pendahuluan. Lebih dari 60% cedera pergelangan tangan mengakibatkan fraktur tulang *scaphoid* dewasa muda yang aktif. Fraktur *scaphoid* sulit didiagnosis karena strukturnya unik dan kompleks, posisinya tumpang tindih terhadap tulang karpal lain, serta belum adanya konsensus yang jelas tentang posisi *wrist joint* saat dilakukan foto radiologi. Hal ini berakibat penanganan yang lambat dan berakhir dengan komplikasi, seperti *non-union, delayed union*, berkurangnya pergerakan *wrist joint*, osteoartritis sendi *radiocarpal,* dan avaskular nekrosis.

Bahan dan cara kerja. Beberapa jenis proyeksi dilakukan untuk mendapatkan penciraan tulang *scaphoid* yang lebih baik. Proyeksi posteroanterior *wrist joint* ekstensi 10°, 15° dan 20° serta deviasi ulna maksimal menggunakan *wrist join frame* didapatkan memberikan gambaran *scaphoid* yang baik. Data tersebut kemudian dinilai untuk menentukan proyeksi ideal gambaran *scaphoid*. Ekstensi dan deviasi ulna dilakukan mengingat posisi anatomis *scaphoid* yang cendrung fleksi pada saat posisi *wrist joint* netral.

Hasil. Dari 60 sampel *wrist joint* kanan dan kiri yang terdiri atas 30 *wrist joint* pria dan 30 *wrist joint* wanita, didapatkan gambaran *scaphoid* yang lebih jelas pada posisi *wrist joint* ekstensi 10° serta deviasi ulna maksimal.

Simpulan. Proyeksi posteroanterior dengan posisi *wrist joint* ekstensi 10° dan deviasi ulna maksimal dapat diajukan untuk pemeriksaan radiologi *scaphoid* yang dicurigai fraktur atau fraktur *occult* selain proyeksi PA netral *wrist*, lateral, dan oblik.

Kata kunci: ekstensi, deviasi ulna, *scaphoid view*

Introduction

Scaphoid fracture incidences are 50-80% of wrist joint injuries in young active peoples. A total of 70% are found at waist scaphoid, 10% at distal pole and 20% at proximal pole.[1,2]

The unique, retrograde vascularisation and mobile function of scaphoid make it vulnerable to injury.[3] Early diagnosis and proper management are important to prevent complications, such as non-union, delayed union, avascular necrosis, reduced motion of wrist joint dan osteoarthritis at radiocarpal joint.[4-6]

Diagnosing fracture and dislocation of carpal bones are difficult due to their overlapping position in most conventional radiographic projection, which are oblique 45° semi-pronated, oblique 45° semi-supinated, PA projection within neutral *wrist*, PA projection with ulna deviation and lateral projection.[7,8] Posteroanterior projection of neutral positioned wrist joint with maximum ulna deviation is often used as one of scaphoid views. However, it still give unsatisfying result because of flexed scaphoid interrupting beam direction.[8,9]

In additon, these fractures actually can be diagnosed by using other radiology modalities. Unfortunately, other imaging modalities, such as CT – scan, MRI and bone scan are not widely available in Indonesia. Therefore, the purpose of this study is to determine the ideal view of scaphoid bone using conventional x-ray.

Materials and methods

In this study, a total of 60 normal wrist joint samples of young active peoples, aged 20–35 years old are examined. They consisted of 30 women and 30 men. Only those without prior history of trauma nor previous surgery around hand were included.

Initially, serial conventional radiography with several projection and certain position of wrist joint was performed. Those positions were done to get scaphoid surface with minimal overlapping. Those positions were PA with wrist joint in neutral position, lateral, oblique 45^{o}, PA neutral with maximum ulna deviation, PA with wrist joint extention 10°, 15°, 20°, 30° and 45° with maximum ulna deviation. From this initial radiography, we found that in wrist joint extension position at 10^{o}, 15° and 20° within maximum ulna deviation.

In maximum ulnar deviation, longitudinal axis of scaphoid was parallel to radial axis because ulnar de-

viation made scaphoid extended. However, it was still overlapping with trapezium at distal end and lunate at proximal end.[9] Approriate extension of scaphoid needed to be done to get clearer surface of scaphoid.

Statistical analysis was performed to calculate the positive and negative predictive value, positive and negative likelihood ratio, and accuracy using both methods.

Results

A total of 60 samples of wrist join radiographs are analyzed. The characteristics of subjects in right and left scaphoid radiographs can be seen in table 1 and 2. There is no age, ulnar deviation, and scaphoid length disparities found in both groups.

We determine the correlation using independent sample T-test. Only one variable is determined to have correlation. There is significant correlation between sex and length of scaphoid ($p<0.05$). There is no difference between right and left wrist.

Data was analyzed by chi-square test. There is significant difference between 10° extention and 15° also 20° group ($p< 0.04$). While using independent T-test, there is no significant difference between sex and degree of wrist extension, ulnar deviation, and overlapping type.

Table 1. Subject characteristics in right and left wrist join radiographs

	Min	Max	Mean	SD
Age	20	33	26.47	4.20
Max ulna dev (deg)	30	45	33.10	3.04
Scaphoid length (mm)	19	24	21.50	1.28

Table 2. Age, maximum ulnar deviation, and scaphoid length difference based on subjects' sex (Mean±SD)

	Age	Max Ulna Dev	Scaphoid length
Man	30.07±1.94	33.67±3.53	22.07±1.03
Woman	22.87±2.23	32.53±2.45	20.93±1.28

Table 3. Overlapping in various degree of scaphoid extension

Overlapping	10° + MAXIMUM ULNA DEVIATION	15° + MAXIMUM ULNA DEVIATION	20° + MAXIMUM ULNA DEVIATION
Clear	7	5	12
pole distal	0	1	1
Pole proximal	2	11	13
pole distal + pole proximal	0	4	4
Total	9	21	30

Discussions

Angle of wrist extension has important role in scaphoid radiography. Extension of wrist joint more than 10° within maximum ulna deviation will bring around overlapping of scaphoid.[21]

Maximum ulna deviation will stabilize scaphoid fracture position with minimal displacement by ligamentotaxis action of radioscaphocapitate ligament, extensor policis longus tendon and abductor policis brevis tendon, that will hold scaphoid between capitate and distal of radius.[21]

Our study found that positioning wrist joint in 10° extention with maximum ulna deviation, using wrist joint frame and perpendicular direction of radiographic beam with postero-anterior projection, can be used to get the clearest view of scaphoid. Our study is consistent with *Stecher's view* that suggest postero-anterior projection with clenched fist and ulnar deviation.[21,22] Furthermore, our results are also consistent with a study reported by Gilula LA and Yin.[23] They reported that wrist joint in maximum ulna deviation with direction of beam 15°-20° give clearer scaphoid view.

Our study technique is easier and more familiar to perform due to simple perpendicular beam direction to wrist joint by using wrist 10° joint frame extention and maximum ulna deviation. In other hand, scaphoid view suggested by Gilula and Yin needs acuration of radiologic beam angle which not all radiographer can do. Whilst Stecher's view hard to perform on patients with deformity at hand and wrist joint due to pain.

Conclusions

Conventional radiography with wrist joint position in 10° extention and maximum ulnar deviation by using wrist frame can be used as one of scaphoid views to get the optimum and clearer surface of scaphoid bone.

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