Analysis of CT and MRI in the Diagnosis of Shoulder Joint Injury

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Abstract

Objective: To observe the effect of multi-slice spiral CT and magnetic resonance imaging (MRI) in the diagnosis of shoulder injury. Methods: 120 patients with shoulder injury who were treated in our hospital (January 2020 to December 2021) and underwent surgical treatment were diagnosed as shoulder injury. They were divided into CT group, MRI group and joint diagnosis group. The detection rates of the two methods were compared. Results: In the diagnosis of shoulder injury, MRI group was higher than CT group, and the joint diagnosis group was higher than the other two groups. Conclusion: In the diagnosis of shoulder injury, the joint examination of multi-slice spiral CT and magnetic resonance imaging (MRI) can obtain a higher diagnostic rate and ideal effect.

Keywords

Multi-Slice Spiral CT, Magnetic Resonance Imaging (MRI), Joint Diagnosis, Shoulder Joint Injury

1. Introduction

The shoulder joint is the most active in all joints of the human body. The degenerative changes of different shoulder tissues (ligaments and rotator cuff), or trauma and excessive repeated use will lead to the injury of the patient's shoulder joint and surrounding tissues [1], which will have a serious impact on the patient's life and work. If it is not diagnosed and treated on time, it will easily lead to many serious complications [2]. In the clinical diagnosis and treatment plan, there are many examination methods used to determine whether shoulder joint injury occurs. The most jointly used ones are: X-ray plain film, computed tomography (CT), multi-slice computed tomography (MSCT), magnetic resonance

imaging (MRI), etc. Traditional conservative treatment can avoid the trauma and risk of surgery, but it may cause serious obstacles to respiratory function and circulatory function [3]. MSCT and MRI have the advantages of simple operation, convenience, noninvasive and high detection rate. They have been gradually used in clinical diagnosis, but they have their own advantages. Therefore, this study adopts the method of joint diagnosis. The results are reported as follows.

2. Object and Method

2.1. General Information

From January 2020 to December 2021, 120 patients with shoulder injury were treated in our hospital and underwent surgical treatment. There were 72 males and 48 females, aged 25 - 75 years, with an average of (46.9 ± 3.5) years. Injury methods: 66 cases of traffic accidents, 34 cases of falling injuries, 16 cases of violent injuries and 4 cases of impact injuries. Inclusion criteria [4]: accept surgical treatment and make clear the diagnosis of shoulder injury; MSCT and MRI were performed before operation, and the clinical and examination data were relatively complete. Exclusion criteria [5]: there are other serious diseases unrelated to this study, such as heart disease, malignant tumor, cerebrovascular disease and so on; Previous shoulder surgery; Patients with severe cognitive impairment, unable to communicate normally and abnormal spirit before operation. This study was approved by the Ethics Committee of the Affiliated Hospital of Chengde Medical College (LL2021048), and all patients signed an informed consent form.

2.2. Method

320 row spiral CT machine (Toshiba, Japan). Its voltage is 120 kv, the rated current is 300 mA, the exposure time is set to 500 ms, the layer thickness is set to 0.6 mm, the spacing is 0.6 mm, and the reconstruction layer thickness is set to 1 mm. Scan the patients with shoulder joint injury with collimation of 0.70 mm × 15, pitch 1.25:1, time 12.5 - 14.77 s. Magnetic resonance imager (Siemens, Germany, 3.0T), slice thickness of 4 mm, spacing of 5 mm, oblique coronal position, including T1WI and T2WI, transverse axial T2WI and oblique sagittal position, were scanned and examined, and the corresponding fat suppression sequences were routinely scanned.

2.3. Evaluation Criteria

The diagnostic detection rates of two different injuries (soft tissue injury and fracture injury) were compared. The diagnostic accuracy of two different injuries was calculated respectively, and the total number of the two injuries was counted to calculate the total detection rate.

2.4. Statistical Analysis

All data in this work were shown as the mean ± standard deviation (SD) and

analyzed by SPSS 25.0 software. Count with% table, the difference was statistically significant ($p < 0.05$).

## 3. Result

In the shoulder joint injury (soft tissue injury and fracture injury), the diagnostic accuracy of the co-diagnosis group was significantly higher than that of MRI group and CT group (Table 1, Figure 1, and Figure 2).

Table 1. Comparison of diagnostic detection rates of two different injuries [n, (%)].

	Fracture (n = 56)		soft tissue injury (n = 64)	
	Detected quantity	Detection rate (%)	Detected quantity	Detection rate (%)
joint group	54	96.43#*	62	71.88#*
MRI group	42	75#	46	96.88#
CT group	30	53.57	28	43.75

*$p < 0.05$ versus CT group, #$p < 0.05$ versus MRI group.
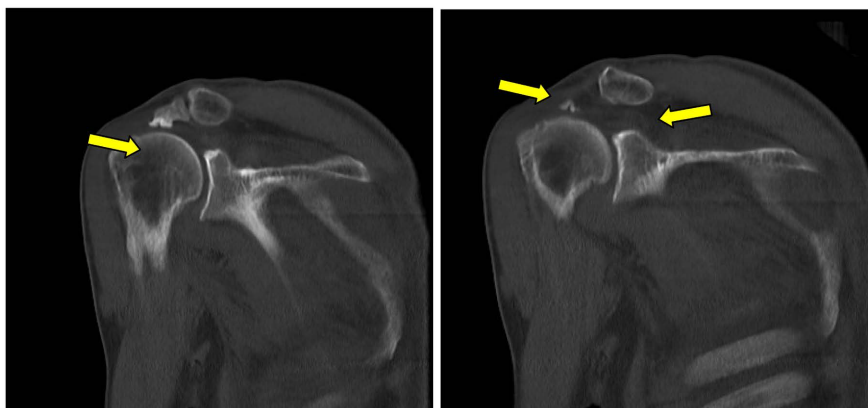
Figure 1. CT: supraspinatus tendon injury, supraglenoid lip injury.
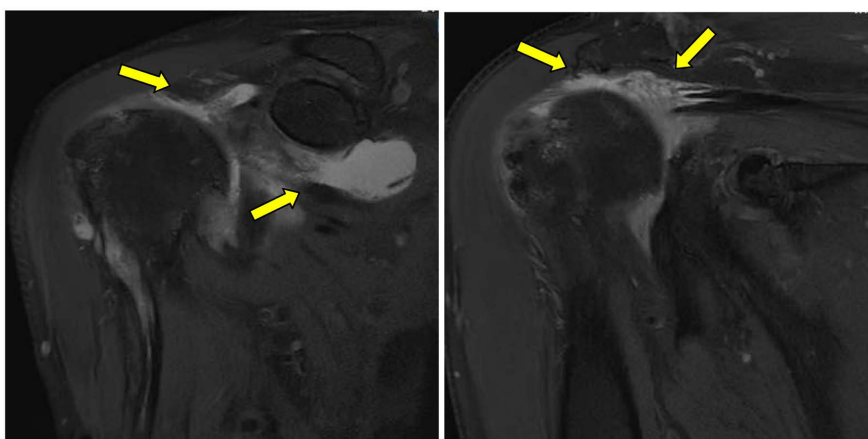
Figure 2. MRI: supraspinatus tendon injury, glenoid injury, joint cavity effusion.

4. Discussion

In all joints of human body, shoulder joint belongs to compound joint, including acromioclavicular joint, glenohumeral joint, scapular thoracic joint and sternoclavicular joint. It undertakes a large amount of movement and can complete many actions of human body in daily life. In the field of anatomy, the rotator cuff with complex structure is attached to the upper part of the humeral head and is composed of many different tendons. Therefore, it can maintain good stability of the shoulder joint [6] [7]. It belongs to a joint ball and socket joint structure and has good flexibility. However, its stability is not good. Excessive use, acute trauma, degenerative changes and anatomical factors can lead to injury, mainly including shoulder soft tissue injury, shoulder fracture and so on [8], which is characterized by obvious persistent pain in the shoulder, inconvenient movement of the joint and serious decline in muscle strength. If not diagnosed and treated in time, it will have a serious impact on the patient's normal life and work [9]. With more and more advanced imaging equipment, the examination is repeatable and patients suffer less. The earlier X-ray examination was gradually replaced by other clinical examination methods due to unclear imaging [10]. DR imaging with clear and high image definition can be used as another way to replace X-ray examination. However, due to the limitation of motor function after injury, the smoothness of examination is affected. Compared with the above two examination methods, multi-slice spiral CT with higher sensitivity, can accurately display the type of joint fracture, dislocation, internal fragments and related complications, and reflect the physiological and anatomical structure of shoulder joint [11]. Because the clinical manifestations of patients with shoulder injury are quite different, it is easy to miss diagnosis or misdiagnosis during the actual examination. MRI is another widely used method for the examination of shoulder joint injury in clinic. T1WI and T2WI in transverse axial position (mainly including lesions of infraspinatus muscle, subscapularis muscle and teres minor muscle), oblique sagittal position (coracoacromial arch) and oblique coronal position (fracture of supraspinatus muscle) are used as the examination sequence [12]. This diagnostic method shows high sensitivity for patients with occult fracture, and can also accurately diagnose rotator cuff injury. Effective combined application is adopted in shoulder joint injury to clearly analyze the adjacent relationship and soft tissue injury, so as to avoid missed diagnosis and misdiagnosis, and provide an accurate basis for clinical treatment. In this study, in the diagnosis of shoulder injury and fracture, the diagnostic accuracy of the joint diagnosis group is higher than that of other groups, and the same conclusion is obtained in the diagnosis of soft tissue injury.

5. Conclusion

To sum up, in the diagnosis of patients with shoulder injury, the joint diagnosis of multi-slice spiral CT and magnetic resonance imaging (MRI) can obtain high diagnostic accuracy and ideal effect regardless of the type of injury.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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