

Research on the application value of ultrasonography of the first metatarsophalangeal joint in the diagnosis of gout.

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Abstract

Objective: To evaluate the efficacy of the first metatarsophalangeal joint ultrasound examination received by gouty patients.

Methods: From May 2016 to May 2017, 55 cases of gouty patients who came to our hospital for diagnosis and treatment were selected as the research objects. Ultrasound examinations were done for patients' bilateral first metatarsophalangeal joint, knee, ankle joint respectively. Ultrasound performances of three different locations were compared.

Results: The examination results showed that the abnormal frequency of ultrasound of bilateral first metatarsophalangeal joint was significantly higher than that of knee and ankle joint. The frequency of specific echocardiography in the first metatarsophalangeal joint was higher than that of the ankle joint and knee joint, and the difference had statistical significance.

Conclusion: The first metatarsophalangeal joint ultrasound diagnosis received by gouty patients has a higher accuracy, which helps to take timely treatment to promote rehabilitation and improve the life quality.

Keywords: Ultrasound diagnosis, Gout, First metatarsophalangeal joint, Diagnostic effect.

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Introduction

Gout is the recurrent inflammatory disease caused by the increase in purine biosynthetic metabolism, excessive production of uric acid or uric acid excretion caused by poor uric acid excretion, uric acid crystals deposited in the synovium, bursa, cartilage and other tissues [1]. Gouty arthritis is the most common clinical disease of gout and the elderly have a higher risk of onset. With the rising trend of population aging in China, the number of patients with gouty arthritis is also on the rise, seriously affecting the quality of life of patients [2].

Clinical presentation shows that the condition can be improved, and recurrent onset can be prevented if gouty arthritis patients adopt early treatment. Early diagnosis is the basis for early treatment of patients. In the past, clinically, the detection of uric acid crystals in synovial fluid is the authoritative standard for gout diagnosis, but detecting the index in small joints is relatively difficult, which may easily leads to missed diagnosis. In addition, the symptom of some gouty patients is not obvious in initial stage, which adds difficulty to clinical diagnosis. A large number of clinical studies have shown that the rate of misdiagnosis and missed diagnosis of early gouty arthritis is relatively high, which affects the accuracy of the diagnostic results. A large number of researches have been done to seek the effective diagnosis of gouty arthritis in clinical trials. These researches show that

ultrasound diagnosis has a good effect on gouty arthritis diagnosis [3]. In addition, almost all gouty arthritis patients would suffer the first metatarsophalangeal joint disease. Therefore, the first metatarsophalangeal joint is more representative during the process of diagnosing the gouty arthritis. This paper mainly analysed the clinical value of the first metatarsophalangeal joint ultrasound diagnosis of gout, and then compared the results of this research with those of ultrasonic diagnosis of knee joint and ankle joint with the details as follows.

Materials and Methods

General information

A total of 55 patients treated in our hospital from May 2016 to May 2017 were selected as the objects in which there were 48 cases of male patients and 7 cases of female patients. The age of the patients was between 47 and 83 with a median age of 67.5 ± 5.8 y. The duration of the disease was 4 months for shortest time and 12 y for the longest time with the median time of 6.7 ± 3.2 y.

Inclusion and exclusion of patients: The selected patients in the group all suffered from acute gout attack in accordance with the relevant clinical diagnostic criteria; The patients had at least one clinical manifestation of a joint acute gout attack and signed informed consent. This study excluded patients

with other jointed lesions and patients who were involuntarily involved in the study.

Inspection methods

The check-up was done by using the iU22 color ultrasound diagnostic instrument produced by Philips. Before check-up, the patients should be informed of relative precautions to enhance compliance of patients. The patients were told to sit or keep supine position during the process of checking. High-frequency broadband line array probe was used for check. Researchers adjusted the frequency to 7-15 MHz and then used skeletal muscle conditions to scan directly. The examinations were done by experienced professional doctors. Ultrasound scanning range mainly included the front of the joint, the rear, medial and lateral [4].

Comparison methods

Comparing the differences of abnormal frequency of the first metatarsophalangeal joint, knee joint and ankle joint under ultrasonography; comparing the abnormal characteristics of gout in the first metatarsophalangeal joint, knee joint and ankle joint under ultrasound scanning.

Statistics analysis

Statistical data package SPSS17.0 was applied for the analysis of the data, the counting data were expressed by the form of number and percentage. When $P < 0.05$, the difference was of statistical significance.

Results

55 patients underwent ultrasonography with the position of diagnosis including bilateral first metatarsophalangeal joint, knee joint and ankle joint. The number of each observation was 110, and the total number of ultrasound joints was 330, and the diagnostic results showed that 76 joints were abnormal, with a proportion of 23.03%. Statistical analysis showed that the number of abnormal joints in the first metatarsophalangeal joint ultrasonography was significantly higher than that in the ankle joint and knee joint of statistical significance, $P < 0.05$. However, there was no significant difference in ultrasonic examination of ankle joint and ultrasonography of knee joint (Table 1).

Table 1. The ultrasound examination performance of the first metatarsophalangeal joint, ankle joint, knee joint ultrasound examination performance.

	The first metatarsophalangeal joint	Ankle joint	Knee joint
Abnormal joints	38 (34.55)	20 (18.18)	18 (16.36)
Normal joints	72 (65.45)	90 (81.82)	92 (83.64)

The proportion of abnormal joints	50% (38/76)	26.32% (20/76)	23.68% (18/76)
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The difference between the first metatarsophalangeal joint and the knee joint is statistically significant. The difference between the first metatarsophalangeal joint and the ankle is also statistically significant. Ultrasound findings showed that in the diagnosis of the first metatarsophalangeal joint, the manifestation frequency of such typical gouty arthritis as high echo on the synovial point, gout, bilateral levy was significantly higher than that of the knee and ankle (Table 2).

Table 2. Ultrasonographical features of typical gouty arthritis in the first metatarsophalangeal joint, ankle, knee joint.

Performance	The first metatarsophalangeal joint (n=38)	Ankle joint (n=20)	Knee joint (n=18)
Strong echo points on the synovium	28 (73.68)	10 (50.0)	3 (16.67)
Gout stone	11 (28.95)	8 (40.0)	6 (33.33)
Bilateral sign	10 (26.31)	4 (20.0)	1 (5.56)

Those kinds of non-specific ultrasound performance articular effusion, synovial thickening, intracranial bursal effusion, joint tendon strong echo did not have statistic difference in the ultrasound diagnosis of first metatarsophalangeal joint, ankle, knee (Table 3).

Table 3. Ultrasonographical manifestations of nonspecific gouty arthritis in the first metatarsophalangeal joint, ankle joint, knee joint.

Performance	The first metatarsophalangeal joint (n=38)	Ankle joint (n=20)	Knee joint (n=18)
Joint effusion	8 (21.05)	6 (30.0)	3 (16.67)
Synovial thickening	13 (34.21)	9 (45.0)	9 (50.0)
Around the joints of the bursa effusion	3 (7.89)	2 (10.0)	4 (22.22)
Around the joints tendon strong echo	2 (5.26)	1 (5.0)	5 (27.77)

Discussion

Ultrasound examination of gout is mainly divided into visible specific and non-specific performance. Non-specific clinical manifestations mainly include joint effusion, synovial thickening, synovial fluid strong echo point. These kinds of ultrasound manifestations may also occur in other joint lesions [5,6]. Therefore, they can't be regarded as the main standard of ultrasound diagnosis of gout. Painful stone and bilateral sign are the specific ultrasound performances of gout, which is of great significance for diagnosis of gouty arthritis.

Ultrasonic diagnosis is the technology which applies ultrasonic detection technology to the human body to diagnose diseases. It obtains and analyses the patient's physiological and organizational data and then judges whether the patients suffer from a disease and provides diagnostic results. Ultrasound diagnosis has advantages of non-invasiveness, painlessness, convenience and intuitiveness. What's more, in recent years, ultrasound diagnosis technology and its accuracy continue to improve, and the clinical application becomes more extensive [7]. This research applied ultrasound techniques to the diagnosis of gout patients by scanning the patient's first metatarsophalangeal joint, ankle, knee scan respectively, which attributes to a good diagnosis result. Compared with other conventional diagnostic techniques, ultrasound diagnostic techniques are less restrictive [8] because most of the common inspection methods are invasive. That is to say that many patients go to the hospital for check and treatment after the diseases get serious. Therefore, the patients fail to accept the proper treatment in the best time, which is not helpful for joint functions recovery of the patients. Clinical studies have shown that ultrasound diagnosis has a good sensitivity for early gout, diagnostic results and compared with X-ray, diagnostic effects are more prior [9]. CT diagnosis can achieve a better assessment for uric acid deposition. MRI diagnosis is good for early gout, what's more, it has a good check sensitivity for bone erosion. However, in actual clinical examinations, both MRI and CT methods are relatively high in terms of cost testing. Therefore, they are not suitable for patients with poor economic conditions [10-12]. Ultrasonography has a good sensitivity and specificity to the gout. What's more, its examination price is relatively low, which provides a cost-effective diagnostic path for patients [13].

This research mainly studies clinical value of the first metatarsophalangeal joint ultrasound diagnosis of gout. Because many clinical experiences have shown that the first metatarsophalangeal joint is the most prone joint for gouty arthritis [14-16]. Some Patients with no typical gouty arthritis symptoms and those who need to confirm whether or not to perform uric acid treatment can have a good diagnostic effect, thus providing valuable reference data for the doctor to determine the patient's condition. In addition, clinic shows asymptomatic hyperuricemia patients will have the bilateral sign, pain and other performance under the examination of ultrasound. In order to avoid misdiagnosis, Ultrasonography on First metatarsophalangeal joint can have accurate judgment for patients' diseases conditions and causes. Some studies suggest that some patients are less likely to receive hypoglycemic therapy, but they have the bilateral sign, gout and other short message ultrasound performance in the ultrasound examination, which indicates that the patient has had uric acid deposition [17]. Referring to the examination results, the doctor can take it into more detailed consideration that whether or not the patients need to receive uric acid treatment. For patients receiving hypoglycemic therapy, receiving the first metatarsophalangeal joint ultrasound can help physicians to make a more scientific assessment of the patient's conditions. [18-20]. This study showed that, compared with ankle, knee

joints, abnormal ultrasound performance of the first metatarsophalangeal joint was obviously different. The incidence of typical ultrasound manifestations was also significantly higher than that of the other two joints, which proved clinical value of the first metatarsophalangeal joint ultrasound diagnosis of gout.

Conclusion

In summary, compared with knee joint ultrasound diagnosis and ankle ultrasound diagnosis, the first metatarsophalangeal joint ultrasound diagnosis has significant advantages. The first metatarsophalangeal joint checked by ultrasound can better show the patient's gouty arthritis lesions and provide the basis for the early clinical treatment. Therefore, this ultrasound diagnosis method is widely recommended in clinical practices.

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