

Liver Elastography for Methotrexate-induced Fibrosis

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Abstract

Methotrexate is a cornerstone medication in the management of various autoimmune diseases, including rheumatoid arthritis, psoriasis, and inflammatory bowel disease. However, its use is associated with the risk of liver toxicity, including fibrosis, which can progress to cirrhosis in severe cases. Liver elastography has emerged as a valuable tool for non-invasive assessment of liver fibrosis, offering significant advantages over traditional biopsy. This article explores the application of liver elastography in detecting and monitoring MTX-induced liver fibrosis. MTX is an antimetabolite and antifolate drug that exerts its therapeutic effects by inhibiting dihydrofolate reductase, thus interfering with folate metabolism. While highly effective in managing autoimmune conditions, MTX can lead to hepatotoxicity, with liver fibrosis being a common manifestation. The exact pathogenesis of MTX-induced liver fibrosis is multifactorial and not fully elucidated but likely involves oxidative stress, inflammatory cytokines, and genetic predisposition.

Keywords: Elastography • Methotrexate • Fibrosis

Introduction

Liver biopsy has traditionally been considered the gold standard for assessing liver fibrosis. However, it is an invasive procedure associated with risks such as bleeding, pain, and sampling variability. Moreover, liver biopsy may not accurately reflect the extent of fibrosis due to sampling error and intraobserver variability. As a result, there is a growing need for non-invasive methods to diagnose and monitor liver fibrosis, especially in patients on long-term MTX therapy. Liver elastography encompasses various non-invasive techniques that measure liver stiffness, which correlates with the degree of fibrosis. Two main modalities include transient elastography and magnetic resonance elastography. TE, also known as FibroScan, uses ultrasound to assess liver stiffness, whereas MRE employs magnetic resonance imaging technology. Liver elastography offers several advantages over liver biopsy. It is non-invasive, painless, and does not carry the same risks as biopsy. Additionally, elastography provides real-time results, allowing for immediate clinical decision-making [1].

Literature Review

Furthermore, it enables repeated assessments, facilitating longitudinal monitoring of fibrosis progression or regression over time. Several studies have demonstrated the utility of liver elastography in detecting and monitoring MTX-induced liver fibrosis. TE has shown promising results in identifying patients at risk of significant fibrosis, allowing for timely intervention to prevent disease progression. Moreover, longitudinal elastography assessments can help clinicians tailor MTX therapy, such as dose adjustments or discontinuation, based on liver fibrosis status. While liver elastography is a valuable tool, it is not without limitations. Factors such as obesity, ascites, and operator experience can affect the accuracy of measurements. Additionally, elastography may not distinguish between different etiologies of liver fibrosis, necessitating clinical correlation and, in some cases, additional diagnostic modalities [2].

The field of liver elastography continues to evolve, with ongoing research aimed at refining techniques and expanding indications. Future studies

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Received: 02 March, 2024, Manuscript No. hps-24-136901; **Editor Assigned:** 04 March, 2024, PreQC No. P-136901; **Reviewed:** 18 March, 2024, QC No. Q-136901; **Revised:** 23 March, 2024, Manuscript No. R-136901; **Published:** 30 March, 2024, DOI: 10.37421/2573-4563.2024.8.273

should focus on standardizing elastography protocols, validating cutoff values for fibrosis stages specific to MTX-induced liver injury, and exploring novel elastography technologies. Furthermore, interdisciplinary collaboration between rheumatologists, gastroenterologists, radiologists, and hepatologists is essential for optimizing the clinical utility of liver elastography in MTX-treated patients. Liver elastography represents a valuable non-invasive tool for assessing MTX-induced liver fibrosis [3]. By providing accurate and timely information on liver stiffness, elastography enables clinicians to monitor fibrosis progression, guide therapeutic decisions, and improve patient outcomes. As the field advances, liver elastography is poised to play an increasingly prominent role in the management of MTX-treated patients, offering a safer and more convenient alternative to liver biopsy. Despite its efficacy, MTX therapy carries inherent risks, including liver toxicity. If left unchecked, MTX-induced liver fibrosis can progress to cirrhosis, leading to complications such as portal hypertension, ascites, hepatic encephalopathy, and hepatocellular carcinoma. Early detection and intervention are crucial to mitigating these adverse outcomes, highlighting the importance of implementing reliable monitoring strategies such as liver elastography.

Discussion

Integrating liver elastography into routine clinical practice requires concerted efforts from healthcare providers, including education, training, and resource allocation. Rheumatologists, dermatologists, gastroenterologists, and other specialists involved in managing patients on MTX therapy should familiarize themselves with liver elastography principles and interpretation. Furthermore, healthcare systems need to ensure access to elastography equipment and expertise, particularly in settings where liver biopsy may be less readily available or feasible. Patient education and engagement are paramount in optimizing the utility of liver elastography in MTX-treated individuals. Patients should be informed about the rationale for liver fibrosis monitoring, the role of elastography in this process, and the potential implications for their treatment plan. Open communication between patients and healthcare providers fosters shared decision-making and empowers patients to actively participate in their care, including adherence to MTX therapy and lifestyle modifications to mitigate liver toxicity [4-6].

Conclusion

Liver elastography represents a paradigm shift in the management of MTX-induced liver fibrosis, offering a safe, accurate, and patient-friendly alternative to liver biopsy. By leveraging advanced imaging technologies to assess liver stiffness non-invasively, elastography enables clinicians to identify individuals at risk of fibrosis progression, tailor MTX therapy accordingly, and intervene early to prevent adverse outcomes. Moving forward, concerted

efforts from healthcare providers, healthcare systems, and patients are needed to integrate liver elastography into routine clinical practice effectively and optimize outcomes for MTX-treated individuals.

Acknowledgement

None.

Conflict of Interest

None.

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How to cite this article: Diane, Rosella. "Liver Elastography for Methotrexate-induced Fibrosis." *J Hepato Pancreat Sci* 8 (2024): 273.