NON-INVASIVE DIAGNOSTIC APPROACHES IN METABOLIC-RELATED STEATOHEPATITIS

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Abstract. This thesis reviews a pragmatic framework for non-invasive diagnosis in metabolic-related steatohepatitis, focusing on test selection, sequencing, interpretation pitfalls, and pathway implementation across primary care and specialist settings.

Keywords: metabolic-related steatohepatitis, metabolic dysfunction–associated steatotic liver disease, non-invasive tests.

INTRODUCTION

Metabolic-related steatohepatitis has moved from being a specialist curiosity to a mainstream clinical problem because metabolic disease is now pervasive and long-lived. The practical consequence is that large numbers of patients have hepatic steatosis, while a smaller but clinically crucial subset develop progressive fibrosis leading to cirrhosis, portal hypertension, and hepatocellular carcinoma. The diagnostic challenge, therefore, is one of scale and prioritization: clinicians must identify the patients who are most likely to experience liver-related complications while avoiding unnecessary invasive

procedures in the majority who will not. Contemporary guidance emphasizes that non-invasive tests should be used in structured case-finding strategies among individuals with cardiometabolic risk factors and evidence of steatosis or abnormal liver enzymes, with special attention to those with type 2 diabetes or obesity because the prevalence of advanced fibrosis is higher in these groups [1].

MAIN PART

Non-invasive diagnosis is best understood as a risk-stratification process rather than a single test result. In routine practice, the outcome-relevant target is advanced fibrosis because fibrosis stage is the strongest predictor of liver-related events across chronic liver diseases. The most scalable approach begins with inexpensive, widely available blood-based scores computed from routine laboratory values. Among these, the fibrosis-4 index is commonly used as a first-line triage tool because it is simple, cost-free, and performs well for ruling out advanced fibrosis in low-prevalence settings when applied with appropriate thresholds. European non-invasive testing guidance describes a stepwise pathway in which a low fibrosis-4 result supports management in primary care with periodic reassessment, while higher or indeterminate values trigger second-line testing. Age is a critical modifier: because age is part of the score, older patients may be falsely labeled high risk unless age-adapted thresholds are used. This is not an academic detail; it is a major determinant of referral volume and diagnostic efficiency in real health systems [2].

Second-line testing typically uses elastography, most commonly vibration-controlled transient elastography, to measure liver stiffness as a surrogate for fibrosis. In metabolic-related steatohepatitis, elastography provides a practical balance of speed, non-invasiveness, and clinical interpretability, and guideline-based algorithms often use liver stiffness thresholds to further separate low-risk from higher-risk individuals. Diagnostic optimization at this stage is less about ordering the test and more about

ensuring the result is trustworthy. Liver stiffness can be inflated by acute inflammation, cholestasis, hepatic congestion, and measurement limitations in severe obesity unless the correct probe is used and quality criteria are met. This is why recent professional guidance places substantial emphasis on imaging-based non-invasive assessment standards and appropriate clinical integration rather than treating elastography as a standalone verdict. In addition to stiffness, controlled attenuation parameter derived during transient elastography can estimate steatosis, but steatosis measurement should be viewed as supportive information; it is fibrosis risk that drives prognosis-oriented decisions [3].

CONCLUSION

Non-invasive diagnosis in metabolic-related steatohepatitis is most effective when it is organized as a stepwise, risk-based pathway rather than a collection of ad hoc tests. The central clinical goal is timely recognition of advanced fibrosis, because fibrosis stage drives prognosis and determines the intensity of monitoring and specialist management. First-line blood-based scores provide scalable triage; elastography and selected biomarker panels refine risk; and advanced imaging or liver biopsy is reserved for discordant, indeterminate, or decision-critical scenarios.

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