Role of Transient Elastography (Fibroscan) in Assessment of Liver Fibrosis in Chronic Hepatitis C Patients

Thesis

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بسم الله الرحمن الرحيم

قَالُوا سُبْحَانَكَ لاَ عِلْمَ لَنَا
إِلاَّ مَا عَلَّمْتَنَا إِنَّكَ أَنتَ الْعَلِيمُ
الْحَكِيمُ

صدق الله العظيم

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Abstract

Liver biopsy has been considered the gold standard and an indispensable reference method for therapeutic decisions regarding chronic hepatitis C, but it is an invasive and painful procedure, with rare but potentially life threatening complications . And it is contraindicated in the presence of some conditions as coagulopathy and thrombocytopenia. And that was the cause to search for other non invasive measures, the most accurate one of them was transient elastography (fibroscan).

Key Words:

Liver biopsy- Transient elastography (fibroscan)

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List of abbreviations

- **AFP:** Alpha feto protein.
- **ALT:** Alanine transferase enzyme.
- **APASL:** Asian pacific association for study of liver disease**.**
- **APRI:** AST-to-Platelet ratio Index.
- **AST:** Aspartate transferase enzyme.
- **AUROC:** Area under ROC curve.
- **BMI :** Body mass index**.**
- **CHD:** Common hepatic duct.
- **DHS:** Demographic health survey.
- **GGT:** Gamma glutamyl transpeptidase.
- **HA:** Hepatic artery.
- **Hb:** Hemoglobin.
- **HVs:** Hepatic veins.
- **ICC :** Intraclass correlation coefficients.
- **IQR :** The interquartile range.
- **Kpa:** Kilo Paskal**.**
- **LNs:** lymph nodes.
- **LS:** liver support.
- **LSM:** Liver stiffness measurement.
- **NHTMRI:** National Hepatology and Tropical Medicine Research Institute.
- **NPV:** Negative predictive value.
- **PBC:** Primary biliary cirrhosis.
- **PPV:** Positive predictive value.
- **PSC:** Primary sclerosing cholangitis.
- **PV:** Portal vein.

List of abbreviations

- **ROC curve:** Receiver operator characteristic curve
- **SD:** Standard deviation**.**
- **SEM:** Standard error of mean.
- **SMA:** Superior mesenteric artery.
- **TE:** Transient elastography.

INTRODUCTION

Hepatitis C virus infection, with an estimated prevalence of more than 170 million people infected worldwide, is a major health problem ***(Lauer et al., 2001)***.

HCV infection and its complications represent major public health problem in Egypt, where 10-13% of the general population is infected **(Mohamed MK, 2004).**

The prevalence of HCV according to demographic health survey done in 2008 under supervision of WHO was found to be 14.7% antibody positive and 9.8% PCR positive. The prevalence of HCV found also to be more common in males than females, rural areas more than urban areas and in older age groups than younger ones***.(DHS 2008).***

Hepatitis C infection is characterized by high rates of chronicity as 70-85% of acute HCV cases evolve into chronic hepatitis ***(Persico et al., 2000).***

Chronic hepatitis C is the most common cause of cirrhosis and hepatocellular carcinoma, and the leading indication for liver transplantation worldwide. Approximately 20% of chronically infected patients develop liver fibrosis and cirrhosis with subsequent progression to end stage liver disease or hepatocellular carcinoma ***(Fontaine H et al., 2007).***

Liver biopsy has been considered the gold standard and an indispensable reference method for therapeutic decisions regarding chronic hepatitis C, as treatment indication is based on histological findings including inflammatory grading and staging ***(Soriano et al., 2007).***

Liver biopsy is an invasive and painful procedure, with rare but potentially life threatening complications. Among the complications of percutaneous liver biopsy are pain (10-30%), bleeding, biliary peritonitis, and pneumothorax. In large series, mortality is very rare but has been reported . Percutaneous liver biopsy is contraindicated in the presence of coagulopathy, thrombocytopenia, and ascites ***(Bravo et al.,2001).***

Transjugular liver biopsy is another procedure used in patients with abnormal coagulation profile. During the biopsy, the doctor inserts a catheter in the jugular vein of the neck and threads it down into the abdomen. Through the catheter, the doctor takes a tiny sample of liver tissue, which is then sent to the pathologist for biopsy to ensure there is no rejection of the liver. This procedure is less traumatic for the patient and involves a quicker recovery time ***(Abujudeh H et al.,2004).***

Thus, many patients with chronic hepatitis C are reluctant to undergo liver biopsy and may be discouraged from starting therapy for this reason ***(Castera et al., 2009).***

These limitations have prompted the search for new approaches and have led to the development of several non invasive tools for assessing fibrosis, such as serum markers of hepatic fibrosis as AST/ALT Ratio, AST to Platelet Ratio Index (APRI score) and Fibrotest and new imaging techniques as(fibroscan) ***(Castera et al., 2008).***

Transient elastography (FibroScan) is a rapid, non-invasive method proposed for the assessment of hepatic fibrosis in patients with chronic liver disease by measuring liver stiffness. It can be easily performed at the bedside or in the outpatients clinic with immediate results and good reproducibility **(Sandrin L.et al.,2003).**

Transient elastography (fibroscan) has been recently demonstrated to be reliable tool for assessing hepatic fibrosis in patients with chronic hepatitis C, with achieving the greatest accuracy for detecting severe fibrosis and cirrhosis ***(Foucher et al., 2006).***

With this method, an ultrasound transducer probe is mounted on the axis of a vibrator. Vibrations of mild amplitude and low frequency are transmitted by the transducer; inducing an elastic shear wave that propagates through the underlying tissues. Pulse echo ultrasound acquisitions are then used to follow the propagation of the shear wave and measure its velocity, which is directly related to tissue stiffness (the elastic modulus): the stiffer the tissue, the faster the shear wave propagates. ***(Ziol et al., 2006).***

Transient Elastography (Fibroscan) has also multiple applications other than detection of cirrhosis in hepatitis C it is also used to evaluate liver stiffness in hepatitis B, evaluation of portal hypertension and oesophageal varices, Hepatitis C recurrence after liver transplantation, chronic cholestatic diseases as primary biliary cirrhosis and primary sclerosing cholangitis, in Hemochromatosis & in alcoholic and non alcoholic fatty liver diseases ***(Arena et al.,2008).***

Aim of the study:

The aim of this work is to correlate the accuracy of Transient Elastography (Fibroscan) in comparison to liver biopsy as a non invasive method for fibrosis assessment in chronic hepatitis C patients.

Anatomy of the Liver

Gross Morphology and Surface Anatomy of the Liver:

The liver is the largest abdominal organ weighting 1400-1800 gm in adults. It is wedge shaped (with its rounded base to the right) and occupies the right hypochondrium, epigastrium and left hypochondrium as far as left midclavicular line (Fig.1) (Standrg et al.,2005). It is covered by a thin connective tissue capsule (Glisson's capsule) that becomes thicker at the hilum. Where the PV and the hepatic artery enter the organ and where the right and the left ducts and lymphatic exit ***(Michael et al., 2003).***

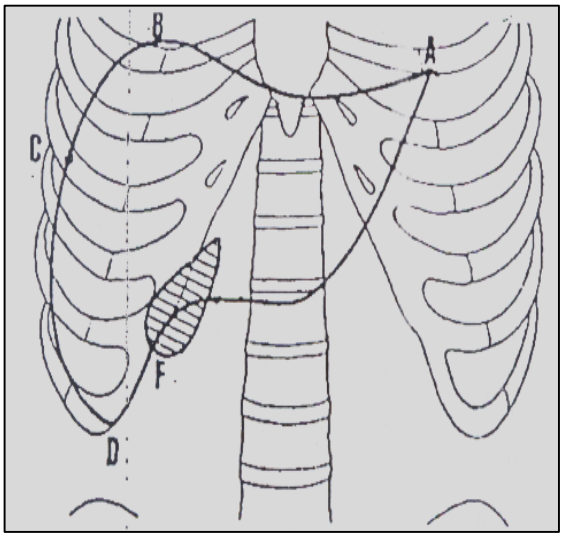

Fig. (1): Surface anatomy of the liver
(Soyer et al.,1993).

The upper border (ABC) passing through xiphisternal joint from point (A) at the lower border of the left 5th rib In the left midclavicular line to point (B) at the upper border of right 4th rib midclavicular to the point (C) at the upper border of right 7th rib In midaxillary line **(Fig.1).**

The right border (C D) extends from point (C) down to point (D) 1/2 cm below the right 10th rib in midaxillary line.