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Real-world Profile and Findings of Transient Elastography in a Moroccan Hepatology Unit: A Cross-sectional Study of 150 Consecutive Patients

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Abstract

Background**:* Transient elastography (TE) with controlled attenuation parameter (CAP) measurement is the recommended first-line non-invasive tool for staging steatosis and fibrosis, yet real-world data from North African hepatology units remain scarce. We describe the referral profile and TE findings of consecutive patients in a Moroccan hepatology department. ***Methods: We retrospectively reviewed 150 consecutive patients who underwent FibroScan with CAP and liver stiffness measurement (LSM) in our department. Patients were grouped by referral indication: suspected hepatic steatosis (n=88), viral hepatitis (n=31), and other chronic liver disease (n=31). CAP was interpreted with published cutoffs (S1 248, S2 268, S3 280 dB/m) and LSM with risk bands (<8, 8-11.9, 12-19.9, >=20 kPa). ***Results:*** The cohort was predominantly female (116 patients, 77.3%), mean age 54.6±13.4 years, mean BMI 28.8±5.3 kg/m2, with diabetes in 39 (26.0%). Significant steatosis (CAP >= 268 dB/m) was present in 65 patients (43.3%). Median LSM was 5.2 (4.1-6.9) kPa (n=149); 7 patients (4.7%) were in the 12-19.9 kPa range and 7 (4.7%) at or above 20 kPa, concentrated in the viral hepatitis and other chronic liver disease groups. In the suspected-steatosis subgroup, significant steatosis was present in 54 of 88 (61.4%) while only 1 of 87 (1.1%) reached the advanced-fibrosis range. Diabetes was the only factor associated with LSM (median 5.9 vs 5.0 kPa, p=0.033). Agreement between CAP and ultrasound for steatosis was poor in the suspected-steatosis subgroup (kappa=0.135). ***Conclusions***: In this real-world Moroccan cohort, significant steatosis was frequent while advanced fibrosis was uncommon among patients referred for suspected steatosis; FibroScan-detected advanced fibrosis concentrated in patients with viral and other chronic liver disease. CAP and ultrasound agreed poorly, supporting TE as the preferred first-line assessment in this setting.

Keywords: Transient elastography; FibroScan; controlled attenuation parameter; liver stiffness; steatotic liver disease; Morocco; liver fibrosis.

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BACKGROUND

Metabolic dysfunction-associated steatotic liver disease (MASLD) has become the leading chronic liver disease worldwide, and the Middle East and North Africa (MENA) region carries one of the highest global prevalence rates, estimated at approximately 36.5% [1]. Despite this burden, Arab institutions contributed only 3.3% of global MASLD publications between 2014 and 2023, a documented gap between disease burden and research output [2].

Vibration-controlled transient elastography (VCTE, FibroScan) simultaneously quantifies liver stiffness measurement (LSM) for fibrosis staging and the controlled attenuation parameter (CAP) for steatosis grading, and is endorsed by current EASL and AASLD guidance as a first-line non-invasive test [3-5]. For MASLD, EASL-ALEH guidance recommends ruling out advanced fibrosis at LSM below 8 kPa, and the EASL-EASD-EASO MASLD guidelines provide CAP cutoffs of 248, 268 and 280 dB/m for grades S1 to S3 [4,5].

Real-world elastography data from North Africa remain scarce, as published FibroScan series largely come from organized screening programmes elsewhere [6]. We therefore described the referral profile, steatosis burden and fibrosis staging of consecutive patients undergoing TE in a Moroccan hepatology unit.

PATIENTS AND METHODS

Design and setting

We conducted a retrospective, anonymized, single-center cross-sectional study in the Department of Hepatology and Gastroenterology, Avicenne University Hospital, Rabat, Morocco, including all consecutive patients who underwent FibroScan examination with concurrent CAP and LSM between December 2024 and July 2026 and whose data were recorded in the departmental database.

Data were obtained from existing medical records and anonymized before analysis, with no additional intervention or patient contact. According to institutional requirements, formal ethics committee approval was not required for this retrospective analysis of anonymized data.

Data collection

For each patient we recorded age, sex, body mass index (BMI), diabetes, hypertension, lipid-lowering treatment, referral indication, abdominal ultrasound findings, lipid panel (total cholesterol, LDL, HDL and triglycerides, in g/L, performed in hospital or private laboratories), CAP in dB/m and LSM in kPa. Only lipid results obtained within three months of the CAP measurement were included. Patient identifiers were replaced with codes before analysis.

Definitions and interpretation criteria

Patients were assigned to three referral groups according to the documented indication: suspected hepatic steatosis, viral hepatitis (hepatitis B or C), and other chronic liver disease. CAP was interpreted with the EASL-EASD-EASO MASLD guideline cutoffs (S1 >= 248, S2 >= 268, S3 >= 280 dB/m) [5]. LSM was interpreted with AASLD/EASL risk bands for MASLD: below 8 kPa rules out advanced fibrosis, 8-11.9 kPa is indeterminate, 12-19.9 kPa makes advanced fibrosis likely, and 20 kPa or above falls in the cirrhosis range [3,4]. Examinations were performed with a FibroScan 530 Compact device (Echosens, Paris, France) by trained operators, and only examinations with at least 10 valid measurements and an interquartile range/median ratio of 30% or less were considered reliable and retained. Raw LSM values were used as the primary analysis variable rather than device letter grades.

Data cleaning

One recorded LSM of 268 kPa (identical to the patient's CAP value, indicating a data-entry error) could not be verified against the original report and was set to missing; LSM analyses therefore include 149 patients. CAP was complete for all 150 patients.

Statistical analysis

Categorical variables are reported as counts and percentages and continuous variables as mean±SD or median (interquartile range, IQR) as appropriate. Group comparisons used chi-square and Mann-Whitney tests, and associations with LSM were explored with Spearman correlations. Agreement between CAP-defined steatosis (>= 248 dB/m) and ultrasound-reported steatosis was assessed with Cohen's kappa. No multivariable regression was performed because only 14 patients reached the 12 kPa thresholds, below accepted events-per-variable thresholds. Analyses were performed with Python (SciPy). Statistical outputs were reviewed and verified by the authors; AI-assisted tools were used for statistical programming support only and not for autonomous interpretation of the results.

RESULTS

Cohort characteristics

The cohort comprised 150 consecutive patients (116 women, 77.3%), of mean age 54.6±13.4 years and mean BMI 28.8±5.3 kg/m2. Diabetes was present in 39 patients (26.0%) and hypertension in 48 (32.0%); 18 patients (12.0%) received lipid-lowering treatment. Referral indications were suspected hepatic steatosis in 88 patients (58.7%), viral hepatitis in 31 (20.7%) and other chronic liver disease in 31 (20.7%). Baseline characteristics are summarized in Table 1.

Table 1: Cohort characteristics by referral group

Characteristic	All (n=150)	Suspected steatosis (n=88)	Viral hepatitis (n=31)	Other CLD (n=31)
Age, years, mean ± SD	54.6 ± 13.4	53.1 ± 13.4	59.7 ± 11.5	53.9 ± 14.4
Female sex	116 (77.3%)	73 (83.0%)	20 (64.5%)	23 (74.2%)
BMI, kg/m2, mean ± SD	28.8 ± 5.3	29.9 ± 4.9	28.2 ± 5.8	26.4 ± 5.3
Diabetes	39 (26.0%)	27 (30.7%)	8 (25.8%)	4 (12.9%)
Hypertension	48 (32.0%)	33 (37.5%)	9 (29.0%)	6 (19.4%)
Lipid-lowering treatment	18 (12.0%)	16 (18.2%)	0 (0.0%)	2 (6.5%)

Original data from this study. Groups were assigned by documented referral reason; lipid values were measured in hospital and private laboratories.

Steatosis and fibrosis by referral group

In the whole cohort, median CAP was 259 (199-304) dB/m and significant steatosis (CAP >= 268 dB/m) was present in 65 patients (43.3%). Median LSM was 5.2 (4.1-6.9) kPa (n=149); 123 patients (82.6%) were below 8 kPa, 12 (8.1%) in the 8-11.9 kPa range, 7 (4.7%) in the 12-19.9 kPa range and 7 (4.7%) at or above 20 kPa. The distribution of LSM risk bands by referral group is shown in Figure 1 and summarized in Table 2. Advanced stiffness was concentrated outside the steatosis referrals: 5 of 31 viral hepatitis patients and 8 of 31 other chronic

liver disease patients were at or above 12 kPa, versus 1 of 88 in the suspected-steatosis group.

Table 2: CAP and LSM by referral group

Variable	All	Suspected steatosis	Viral hepatitis	Other CLD
CAP, dB/m, median (IQR)	259 (199-304)	282 (243.8-312)	217 (168-260)	213 (160-259)
Significant steatosis (CAP >= 268 dB/m)	65 (43.3%)	54 (61.4%)	5 (16.1%)	6 (19.4%)
LSM, kPa, median (IQR)	5.2 (4.1-6.9)	4.6 (4.0-6.4)	6.4 (4.6-9.9)	6.0 (4.6-13.0)
LSM < 8 kPa	123 (82.6%)	82 (94.3%)	21 (67.7%)	20 (64.5%)
LSM 8-11.9 kPa	12 (8.1%)	4 (4.6%)	5 (16.1%)	3 (9.7%)
LSM 12-19.9 kPa	7 (4.7%)	1 (1.1%)	3 (9.7%)	3 (9.7%)
LSM >= 20 kPa	7 (4.7%)	0 (0.0%)	2 (6.5%)	5 (16.1%)

Original data from this study; interpretation criteria adapted from published guidance as described in Methods (CAP cutoffs per EASL-EASD-EASO MASLD CPG 2024; LSM risk bands per AASLD/EASL MASLD guidance). LSM percentages are within each group (n=149 overall).

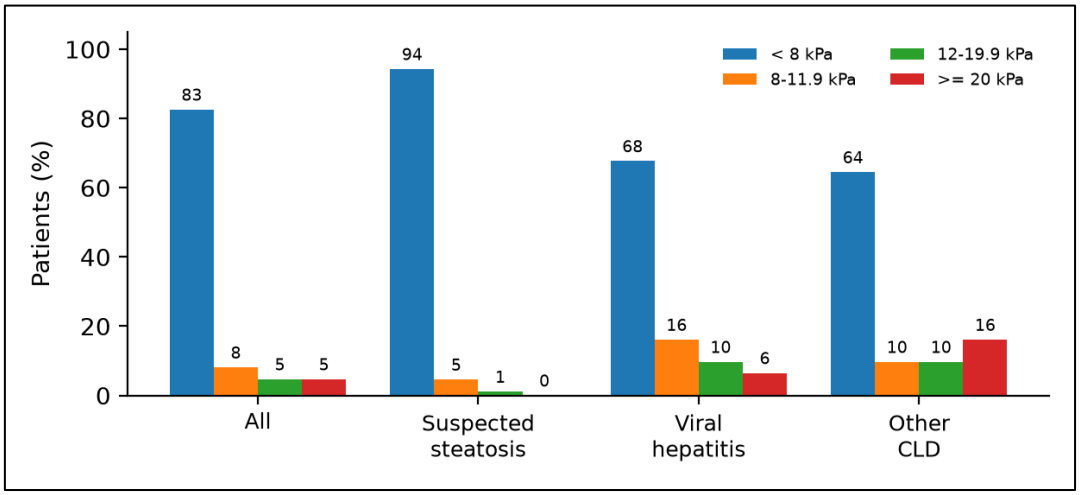

Figure 1: Distribution of LSM risk bands by referral group (%). All data original to this study

Suspected-steatosis subgroup

Among the 88 patients referred for suspected steatosis (73 women, 83.0%; BMI 29.9±4.9 kg/m2; diabetes 30.7%), median CAP was 282 (243.8-312) dB/m. Significant steatosis was present in 54 (61.4%) and severe steatosis (>= 280 dB/m) in 46 (52.3%). LSM remained reassuring: 82 of 87 valid measurements (94.3%) were below 8 kPa and only 1 patient (1.1%) reached the advanced-fibrosis range.

Diabetes was more frequent among patients with significant steatosis (21 of 27, 77.8%) than without (33 of 61, 54.1%), although the difference did not reach significance (chi-square 3.48, p=0.062). Agreement between CAP (>= 248 dB/m) and ultrasound-reported steatosis was poor in this subgroup: both positive in 57, CAP positive only in 5, ultrasound positive only in 17, and both negative in 4 patients (n=83; kappa=0.135). Across the whole cohort agreement was moderate (kappa=0.478, n=144).

Associations with liver stiffness

In exploratory analyses, LSM was not significantly correlated with age (rho=0.133, p=0.107), BMI (rho=-0.134, p=0.104) or CAP (rho=-0.077, p=0.352). Patients with diabetes had higher median LSM than patients without diabetes (5.9 vs 5.0 kPa, Mann-Whitney p=0.033); this was the only significant association (Table 3).

Table 3: Exploratory associations with LSM (n=149)

Association	Statistic	p value	n
Age	rho = 0.133 (Spearman)	0.107	149
BMI	rho = -0.134 (Spearman)	0.104	149
CAP	rho = -0.077 (Spearman)	0.352	149
Diabetes vs no diabetes	median 5.9 vs 5.0 kPa (Mann-Whitney)	0.033	149

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Original data from this study; exploratory analysis. No multivariable regression was performed because only 14 patients reached the 12 kPa thresholds.

DISCUSSION

In this real-world cohort from a Moroccan hepatology unit, three findings stand out. First, significant steatosis was frequent: 43.3% of all patients and 61.4% of those referred for suspected steatosis had CAP values at or above 268 dB/m, consistent with the high regional MASLD burden reported for the MENA region [1]. Second, advanced fibrosis was uncommon among steatosis referrals (1 of 87, 1.1%) but concentrated in patients referred for viral hepatitis and other chronic liver disease (12 of 62 at or above 12 kPa), confirming that in our setting the main yield of elastography lies in staging known chronic liver disease rather than in the steatosis pathway. Third, agreement between CAP and ultrasound for steatosis was poor in the subgroup where ultrasound had driven the referral (kappa=0.135), with ultrasound overcalling mild steatosis in 17 of 83 patients.

The pattern of frequent steatosis with little advanced fibrosis matches biopsy-based NAFLD cohorts, in which significant fibrosis is far less prevalent than steatosis itself [7]. The poor CAP-ultrasound agreement reflects the known limits of conventional ultrasound for mild steatosis and supports TE as the preferred first-line non-invasive assessment [3-5]. The higher LSM in diabetic patients, the only significant association in our data, is consistent with the contribution of diabetes to fibrosis progression in steatotic liver disease [8].

Our study has limitations. Its retrospective single-center design and referral-based sampling mean the cohort is not a prevalence sample. No biopsy or laboratory fibrosis scores were available, so no diagnostic-accuracy analysis or cutoff derivation was possible. Laboratory values came from hospital and private laboratories. The female predominance (77.3%) limits generalizability, one LSM value was lost to a data-entry error, and CAP reliability criteria were not systematically recorded, precluding quality-control analyses.

CONCLUSIONS

In this Moroccan real-world cohort, significant steatosis was frequent while advanced fibrosis was rare among patients referred for suspected steatosis, and elastography-detected advanced fibrosis concentrated in viral and other chronic liver disease. These data support structured use of FibroScan as first-line assessment for both steatosis and fibrosis staging in our setting, and provide one of the few published real-world elastography profiles from North Africa.

Declarations

Ethics approval and consent to participate

Data were obtained from existing medical records and anonymized before analysis, with no additional intervention or patient contact. According to institutional requirements, formal ethics committee approval was not required for this retrospective analysis of anonymized data.

Consent for publication

Not applicable. No identifiable individual data are presented.

Availability of data and materials

The datasets analyzed during the current study are not publicly available because they contain indirect identifiers from a single hospital department, but anonymized analysis datasets are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

Saja El Masaoudi: study conception and design, data collection, manuscript drafting. Mouna Salihoun, Mohamed Acharki and Saloua El Aoula: data collection and verification, critical revision. Nawal Kabbaj: supervision, methodology, critical revision. All authors read and approved the final manuscript.

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List of abbreviations

- APRI: aspartate aminotransferase to platelet ratio index
- BMI: body mass index
- CAP: controlled attenuation parameter
- ELF: enhanced liver fibrosis
- HCC: hepatocellular carcinoma
- HDL-C: high-density lipoprotein cholesterol
- IQR: interquartile range
- LDL-C: low-density lipoprotein cholesterol
- LSM: liver stiffness measurement
- MASLD: metabolic dysfunction-associated steatotic liver disease
- MENA: Middle East and North Africa
- TE: transient elastography
- VCTE: vibration-controlled transient elastography

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