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The impact of liver steatosis on the ability of serum ferritin levels to predict Liver Iron Concentration in Non-Transfusion-Dependent Thalassaemia patients

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Introduction

- Fatty liver is a common abnormality encountered in western countries among patients undergoing imaging of the abdomen
- In numerous conditions associated with fatty liver, steatosis may progress to steatohepatitis (with inflammation, cell injury, or fibrosis accompanying steatosis) and then to cirrhosis, where the increased ferritin levels frequently observed are markers of systemic inflammation, unrelated to the presence iron overload
- in patients with iron loading anaemia, including the main NTDT subtypes, a strict relationship between serum ferritin levels and liver iron concentration (LIC)
- The purpose of this study was to retrospectively analyze the occurrence of liver steatosis and its impact on the relationship between serum ferritin levels and LIC and liver parameters in all our population of NTDT patients

Matherial and Methods

- One hundred and ten NTDT patients followed at AORN Cardarelli center in Naples, Italy, were retrospectively evaluated
- Liver iron concentration (LIC) measurements were available for 64 patients (54%) who underwent a magnetic resonance Imaging (MRI) scan within the Myocardial Iron Overload in Thalassaemia (MIOT) network
- The diagnosis of liver steatosis was ultrasound-based (US).
- Laboratory investigations included: 1) iron status as indicated by serum ferritin levels; 2) liver function as indicated by serum level of alanine transaminase (ALT) and aspartate transaminase (AST)

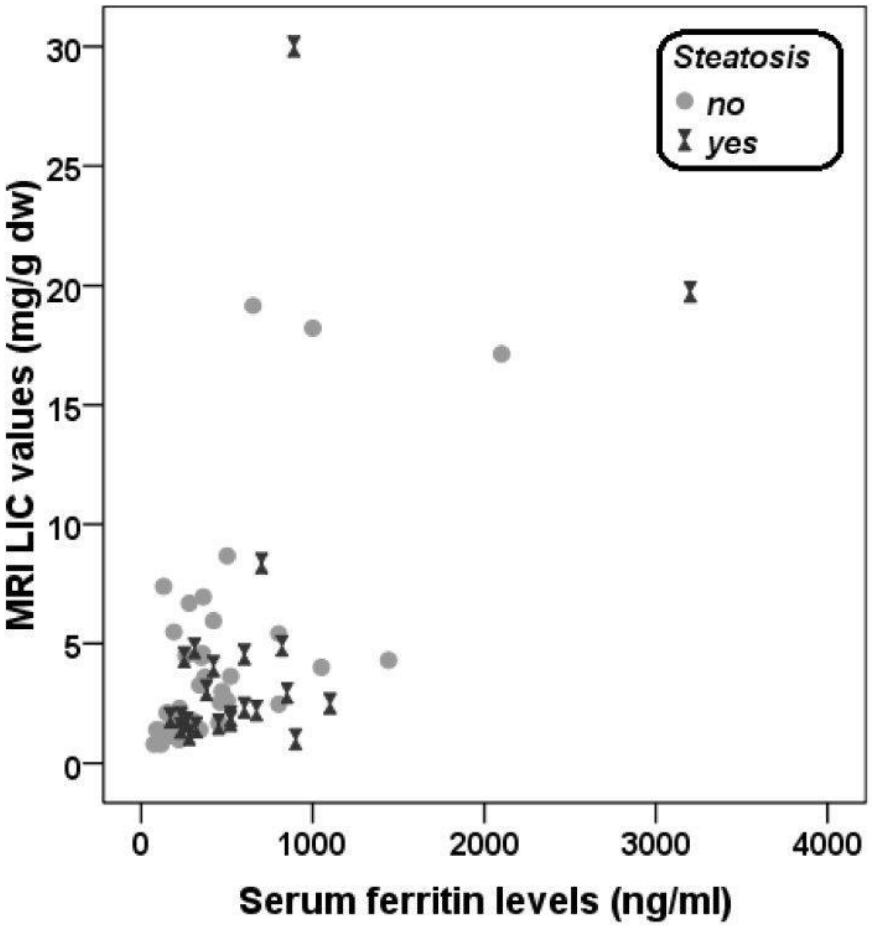
Table 1. Main characteristics of patients with Non-Transfusion-Dependent Thalassaemia.

	110 patients
Sex (M/F)	49/61
Age (years)	40.56 ± 16.00
Age at diagnosis (years)	20.05 ± 17.03
History of transfusion, N (%)	50 (45.5)
Splenectomy, N (%)	38 (34.5)
HCV RNA positivity, N (%)	5 (4.5)
Body mass index (kg/m2)	23.69 ± 3.56
Liver steatosis, N (%)	39 (35.5)
Serum ferritin levels (ng/ml)	459.39 ± 577.14
ALT (U/l)	20.81 ± 14.23
AST (U/l)	23.66 ± 9.64
ALT/AST ratio	0.86 ± 0.31
MRI LIC values (mg/g dw)	4.42 ± 5.34 (N=64)

Results

Table 1. Comparison between patients without and with liver steatosis.

	No steatosis (N=71)	**Steatosis (N=39)**	**P-value**
Age (years)	38.78 ± 17.45	43.79 ± 12.53	0.085
BMI (kg/m2)	22.89 ± 3.19	24.99 ± 3.78	0.005
HCV+, N (%)	3 (4.2)	2 (5.1)	0.828
ALT (U/l)	14.80 ± 5.29	31.74 ± 16.42	<0.0001
AST (U/l)	21.29 ± 7.73	27.97 ± 11.27	0.001
ALT/AST ratio	0.72 ± 0.16	1.12 ± 0.35	<0.0001
Ferritin (ng/ml)	374.10 ± 400.74	614.67 ± 788.22	0.002
LIC (mg/g dw)	4.21 ± 4.45 (N=41)	4.78 ± 6.74 (N=23)	0.905



Overall: R=0.558, P<0.0001

No Steatosis R=0.656, P<0.0001

steatosis: R=0.426, P=0.05

Figure 2. Plot of MRI LI C values versus serum ferritin levels

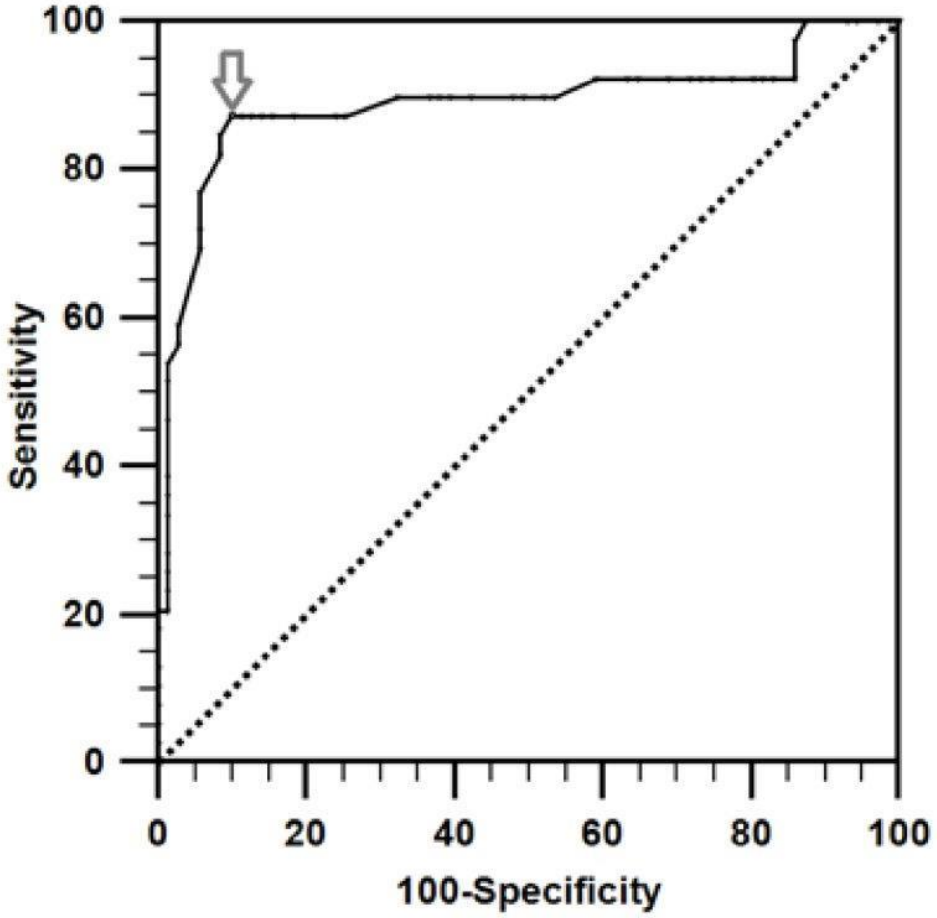


Figure 1. ROC curve analysis of AST/ALT ratio to predict liver steatosis.

Conclusions

- liver steatosis was a prevalent (35%) disease in NTDT patients, particularly males
- in addition to iron overload, the liver steatosis may be responsible for a further increase in liver damage
- patients with liver steatosis, despite having comparable iron burden, had higher serum transaminases levels than those without, even within the normal range in both sexes
- the ability of high ALT/AST ratio to predict the presence of liver steatosis was maintained
- NAFLD had an impact on the correlation between LIC and ferritin level being responsible for a mean twice increase in serum ferritin level in presence of comparable amount of iron overload
- may lead to overestimate the magnitude of iron burden and may be responsible for anticipating or exceeding chelation treatment in patients with NTDT in absence of a LIC assessment.