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EFICACIA DE LA OPINIÓN DEL CIRUJANO EXTRACTOR PARA PREDECIR EL GRADO DE ESTEATOSIS DE LOS INJERTOS HEPÁTICOS

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INTRODUCCIÓN

ESTEATOSIS HEPÁTICA:

- Acumulación de triglicéridos en el citoplasma del hepatocito
- Histología: macrovesicular y microvesicular
- Prevalencia 20-30% (infradiagnosticada)
- Causas más frecuentes: hepatopatía alcohólica y hepatopatía grasa no alcohólica
- Amplio espectro de lesiones hepáticas

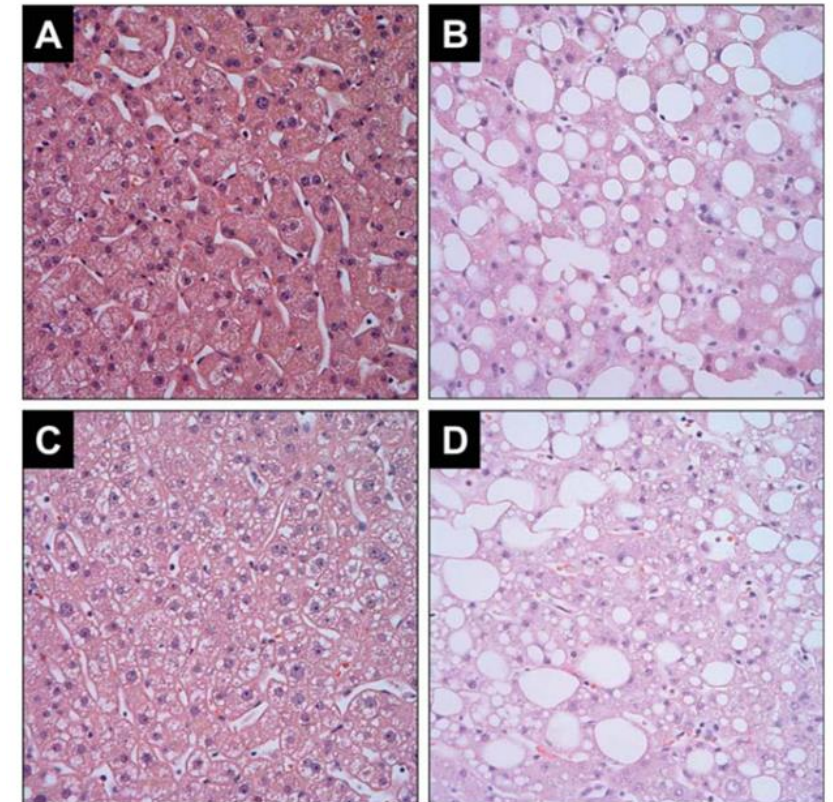


Figure 1. Different types of steatosis in donor livers: (A) no steatosis, (B) predominantly ld-MaS (70%), (C) predominantly sd-MaS (50%), and (D) mixed sd-MaS (40%) and ld-MaS (30%; H&E stain, $\times 400$).

ESTEATOSIS Y TRASPLANTE HEPÁTICO

- Esteatosis asociada a disfunción del injerto post trasplante y factor de riesgo de esteatosis/esteatohepatitis en el receptor
- **Valoración precisa en donantes de riesgo.**
- Extended-criteria:
 - Esteatosis macrovesicular <30% – **acceptable**
 - >30% factor de riesgo independiente de supervivencia del injerto reducida a 1 año
- Biopsia hepática – gold standard.
- Valoración macroscópica del cirujano

El grado de exactitud del cirujano extractor es inferior al 70% en esteatosis severa, con VPP 71, 46 y 17% para esteatosis grave, moderada y leve, respectivamente.

Adam R et al. The outcome of steatotic grafts in liver transplantation. Transplant Proc. 1991 Feb;23

Risk Factors and Clinical Course for Liver Steatosis or Nonalcoholic Steatohepatitis After Living Donor Liver Transplantation

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Background. Posttransplant liver steatosis occurs frequently and can affect patient outcome. Our aim was to clarify the risk factors for steatosis or steatohepatitis after living donor liver transplantation (LT) through a retrospective examination of recent 100 living donor LT recipients and their liver donors. **Methods.** Liver biopsy was performed at 1 year after LT and each year, thereafter, or as needed due to abnormal liver enzyme levels, with a median follow-up of 4 years (2-10 years). **Results.** Liver steatosis ($\geq 5\%$) was identified in 33 cases, with steatohepatitis identified in 9 of 33 patients with liver steatosis. Recipients with liver steatosis were younger than those without steatosis (53.4 ± 9.5 years vs 57.6 ± 9.9 years, respectively; $P = 0.045$). **Of note, the prevalence of steatosis was significantly higher among LT recipients who received a graft from a donor with steatosis than without (60% vs 23%, respectively; $P = 0.001$).** Donor steatosis was also associated with steatohepatitis in recipients after LT (steatohepatitis/simple steatosis, 88%:50%). On multivariate analysis, younger recipient age ($P = 0.023$) and donor steatosis ($P = 0.005$) were independent risk factors of liver steatosis after LT. Among the 33 recipients in our study group, 26 were assessed by serial liver biopsies, with 6 showing progression of the nonalcoholic fatty liver disease activity score. An increase in body weight was predictive of steatosis progression after LT ($P = 0.005$). **Conclusions.** Age and donor steatosis influence the risk of liver steatosis and steatohepatitis in recipients after LT. The clinical course of steatosis is relatively benign, with only 19% developing nonalcoholic fatty liver disease activity score and 7.6% significant fibrosis.

(*Transplantation* 2019;103: 109–112)

Assessment of Hepatic Steatosis by Transplant Surgeon and Expert Pathologist: A Prospective, Double-Blind Evaluation of 201 Donor Livers

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An accurate clinical assessment of hepatic steatosis before transplantation is critical for successful outcomes after liver transplantation, especially if a pathologist is not available at the time of procurement. This prospective study investigated the surgeon's accuracy in predicting hepatic steatosis and organ quality in 201 adult donor livers. A steatosis assessment by a blinded expert pathologist served as the reference gold standard. The surgeon's steatosis estimate correlated more strongly with large-droplet macrovesicular steatosis [ld-MaS; nonparametric Spearman correlation coefficient (r_s) = 0.504] versus small-droplet macrovesicular steatosis (sd-MaS; r_s = 0.398). True microvesicular steatosis was present in only 2 donors (1%). Liver texture criteria (yellowness, absence of scratch marks, and round edges) were mainly associated with ld-MaS (variance = 0.619) and were less associated with sd-MaS (variance = 0.264). The prediction of $\geq 30\%$ ld-MaS versus $< 30\%$ ld-MaS was excellent when liver texture criteria were used (accuracy = 86.2%), but it was less accurate when the surgeon's direct estimation of the steatosis percentage was used (accuracy = 75.5%). The surgeon's quality grading correlated with the degree of ld-MaS and the surgeon's steatosis estimate as well as the incidence of poor initial function and primary nonfunction. In conclusion, the precise estimation of steatosis remains challenging even in experienced hands. Liver texture characteristics are more helpful in identifying macrosteatotic organs than the surgeon's actual perception of steatosis. These findings are especially important when histological assessment is not available at the donor's hospital. *Liver Transpl* 19:437–449, 2013.

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Líneas de investigación

Assessment of hepatic steatosis: comparison of quantitative and semiquantitative methods in 108 liver biopsies

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Predicting Hepatic Steatosis in Living Liver Donors Via Controlled Attenuation Parameter

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ORIGINAL ARTICLE

Identification of hepatic steatosis in living liver donors by machine learning models

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LIVER
COLOR



OBJETIVO



El objetivo principal era analizar la capacidad del cirujano extractor en la evaluación de la esteatosis del injerto, así como en la selección del mismo.

MATERIAL Y METODOS



Estudio descriptivo. Recogida prospectiva



Datos de todos los injertos hepáticos valorados para trasplante hepático

Características del donante

Tipo de extracción

Motivo rechazo

Esteatosis en opinión del cirujano → **Esteatosis macrovesicular significativa $\geq 30\%$**

Biopsia hepática



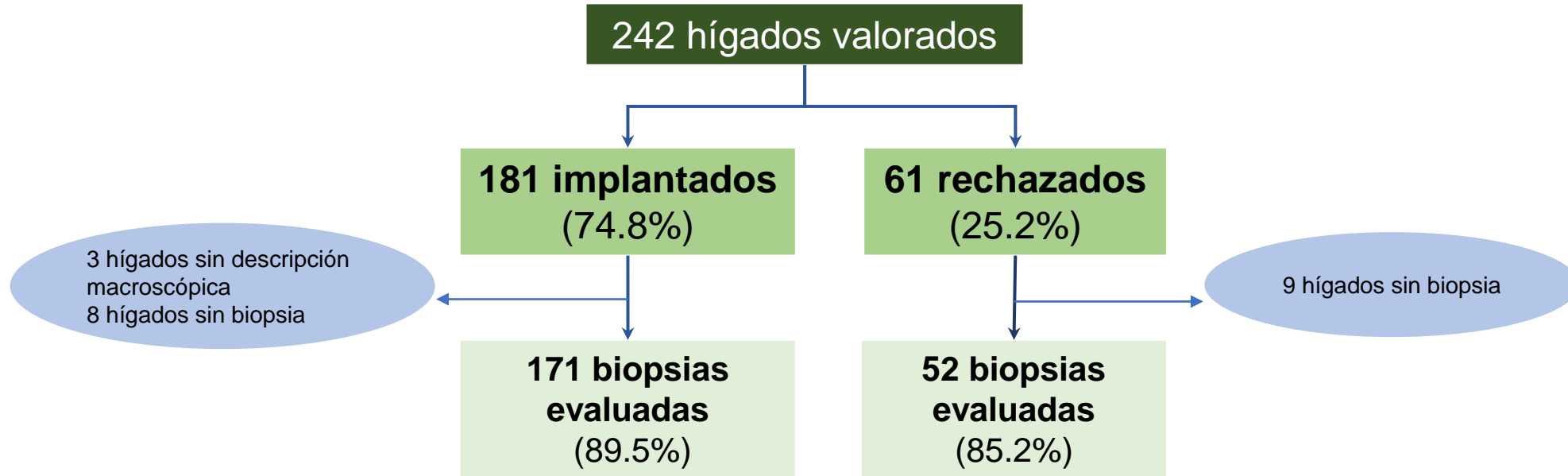
Enero 2020 - julio 2023



Hospital universitario de Bellvitge

*Medidas de precisión diagnóstica y área
bajo la curva ROC (AUC)*

RESULTADOS



RESULTADOS

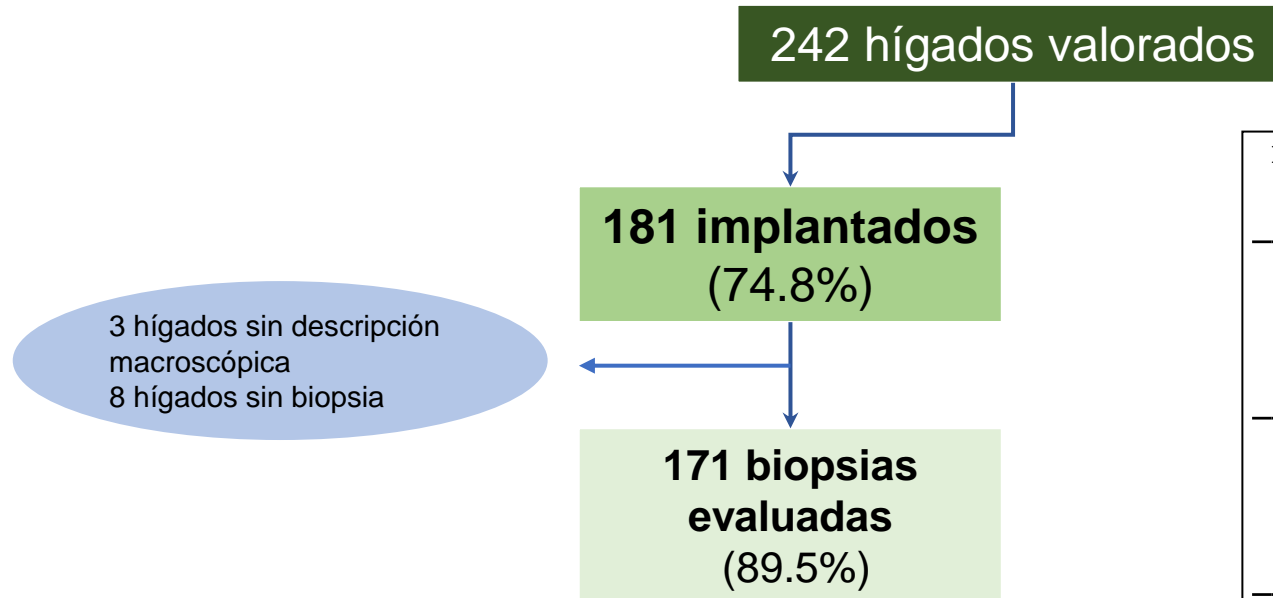
CARACTERISTICAS DEL DONANTE

		TOTAL (n 242)	Implantados (n 181)	Rechazados (n 61)	P
Edad (mediana, IQR)		62,5 (52,5-70,1)	62,4 (49,4-69,4)	62,7 (58-71,3)	P<0,077
Sexo		H 186 (76,9%) M 56 (23,1%)	H 148 (81,8%) M 33 (18,2%)	H 38 (62,3%) M 23 (37,7%)	P<0,002
IMC (mediana, IQR)		25,9 (23,5-27,9)	25,4 (23,4-27,7)	26,8 (24,2-29,4)	P<0,008
GRUPO	A+	86 (35,5%)	63 (34,8%)	23 (37,7%)	P<0,98
	A-	20 (8,3%)	15 (8,3%)	5 (8,2%)	
	B+	25 (10,3%)	19 (10,5%)	6 (9,8%)	
	B-	2 (0,8%)	2 (1,1%)	0	
	AB+	5 (2,1%)	4 (2,2%)	1 (1,6%)	
	AB-	1 (0,4%)	1 (0,6%)	0	
	O+	78 (32,2%)	59 (32,6%)	19 (31,3%)	
	O-	25 (10,3%)	18 (9,9%)	7 (11,5%)	
HTA		77 (31,8%)	42 (23,2%)	29 (47,5%)	P<0,00
DM		40 (16,5%)	26 (14,4%)	14 (23%)	P<0,12
Cardiopatía isquémica		12 (5%)	7 (4%)	5 (8,2%)	p<0,18
Vasculopatía periférica		5 (5%)	1 (0,6%)	4 (6,6%)	P<0,04
Neoplasia		14 (5,8%)	11 (6,1%)	3 (4,9%)	P<0,73

CARACTERÍSTICAS DEL DONANTE

		TOTAL (n 242)	Implantados (n 181)	Rechazados (n 61)	P
Diagnóstico	AVC	114 (47,1%)	81 (45%)	33 (54,1%)	P<0,45
	TCE tránsito	30 (12,4%)	26 (14,4%)	4 (6,6%)	
	TCE altres	18 (7,4%)	14 (7,8%)	4 (6,6%)	
	Anóxia	50 (20,7)	36 (20%)	14 (23%)	
	Otros	29 (12%)	23 (12,8%)	6 (9,8%)	
UCI (días, mediana, IQR)		4 (2-8)	4 (2-8)	4 (2-8)	P<0,612
Parada cardiorespiratoria		64 (26,4%)	42 (23,2%)	22 (36,1%)	P<0,049
Min PCR (días, mediana, IQR)		24,5 (12,5-31)	24,5 (14-30)	24,5 (12-35)	P 0,702
Hipotensión		29 (12%)	20 (11%)	9 (14,8%)	P<0,44
Noradrenalina		153 (63,2%)	118 (65,2%)	35 (57,4%)	P<0,27
Tipo de donación	Muerte encefálica	138 (57%)	111 (61,3%)	27 (44,3%)	p<0,02
	Asistolia	104 (43%)	70 (38,7%)	34 (55,7%)	

RESULTADOS



- No se implantó ningún hígado con esteatosis cirujano > 30%
- 98.25% éxito en la valoración de esteatosis según el cirujano
- De 51 hígados valorados como esteatosis aceptable, 3 con esteatosis >30%

Esteatosis cirujano^	Esteatosis biopsia		Total
	<30%	>30%	
Sense	120 100.00 71.43	0 0.00 0.00	120 100.00 70.18
<30%	48 94.12 28.57	3 5.88 100.00	51 100.00 29.82
Total	168 98.25 100.00	3 1.75 100.00	171 100.00 100.00

Pearson chi2(1) = 7.1849 Pr = 0.007
 Fisher's exact = 0.025
 1-sided Fisher's exact = 0.025

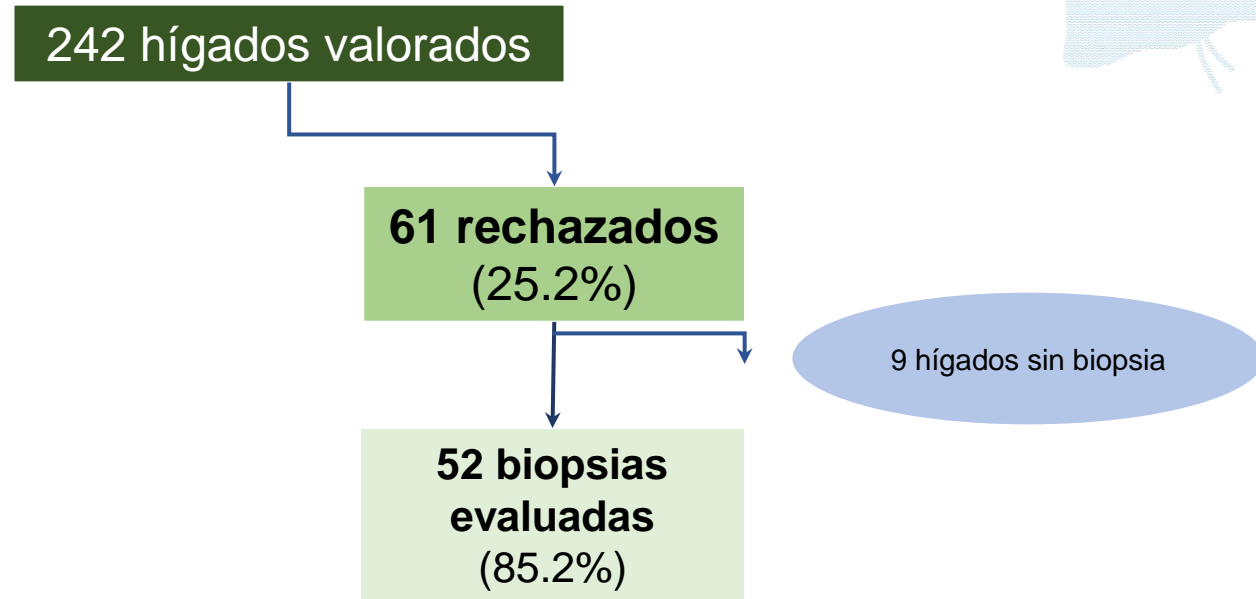
Incidencia fallo primario periodo de estudio: 1,8 %.

Esteatosis Cirurgià	Esteatosis biòpsia		Total
	<30%	>30%	
<30%	32 91.43 82.05	3 8.57 23.08	35 100.00 67.31
>30%	7 41.18 17.95	10 58.82 76.92	17 100.00 32.69
Total	39 75.00 100.00	13 25.00 100.00	52 100.00 100.00

Pearson chi2(1) = 15.4106 Pr = 0.000
Fisher's exact = 0.000
1-sided Fisher's exact = 0.000

Esteatosis cirurgià	Sense	Esteatosis AP macro			Total
		<30%	30%-60%	>60%	
Sense	16 80.00 61.54	4 20.00 30.77	0 0.00 0.00	0 0.00 0.00	20 100.00 38.46
<30%	7 46.67 26.92	5 33.33 38.46	1 6.67 11.11	2 13.33 50.00	15 100.00 28.85
30%-60%	3 21.43 11.54	4 28.57 30.77	7 50.00 77.78	0 0.00 0.00	14 100.00 26.92
>60%	0 0.00 0.00	0 0.00 0.00	1 33.33 11.11	2 66.67 50.00	3 100.00 5.77
Total	26 50.00 100.00	13 25.00 100.00	9 17.31 100.00	4 7.69 100.00	52 100.00 100.00

Pearson chi2(9) = 39.1905 Pr = 0.000
Fisher's exact = 0.000



- Grado de acierto esteatosis <30% fue del 91,43% (32/35)
- Grado de acierto esteatosis ≥ 30% fue del 58.8% (10/17)

Motivo principal rechazo → aspecto macroscópico del injerto (23p, 37,7%), se rechazaron **69% (42/61)** por combinación de factores.

MOTIVO RECHAZO en esteatosis observada por el cirujano <30%	n 42 (%)
Neoplasia	5 (11,9)
Tiempo isquemia funcional caliente	2 (4,76)
Congestión/esteatosis	11 (26,19)
Mala perfusión	3 (7,14)
Evolución ECMO	6 (14,29)
Arterioesclerosis	5 (11,9)
Fibrosis/HTP	7 (16,67)
Técnica	3 (7,14)



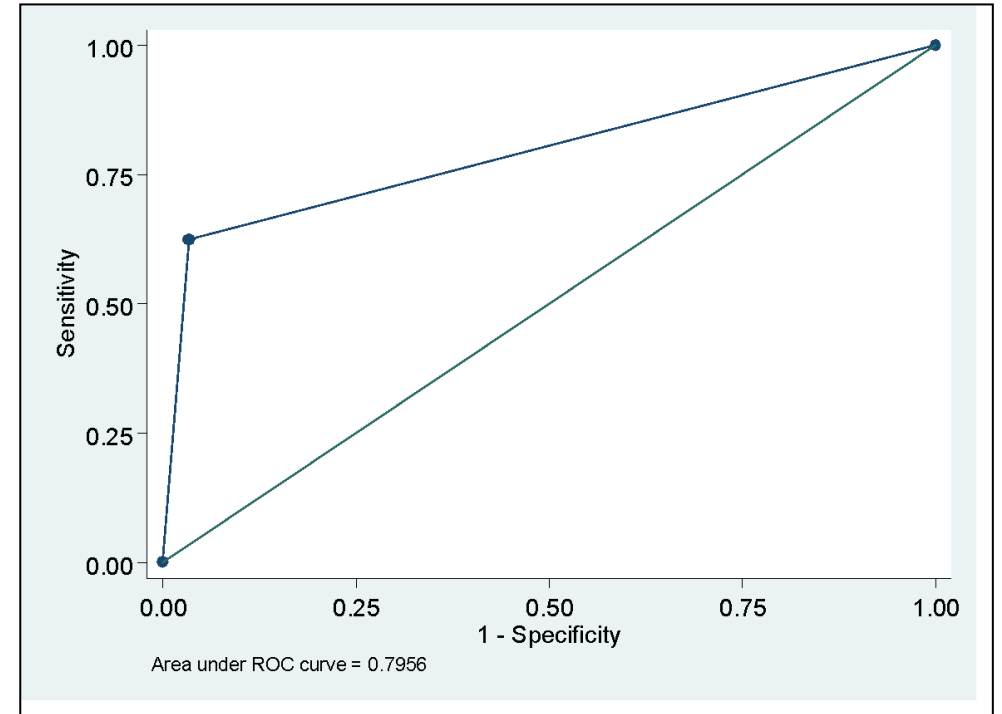
GLOBALMENTE

Valoración esteatosis significativa por parte del cirujano:

- Sensibilidad: 62,5%
- Especificidad: 96,6%
- Valor predictivo positivo: 58.8%
- Valor predictivo negativo: 97,1%

Área bajo la curva ROC (AUC) 0,8.

Índice Kappa de concordancia del 0,53 (moderado)



Obs	ROC Area	Std. Err.	Asymptotic Normal [95% Conf. Interval]	
223	0.7956	0.0628	0.67247	0.91877

CONCLUSIONES

La opinión del cirujano extractor en la valoración de la esteatosis significativa en los injertos hepáticos muestra una aproximación excelente.

Los hígados implantados con esteatosis considerada tolerable demostraron una baja tasa de disfunción primaria.

