

Elastografía por Ondas de Cizalla: Aplicaciones en Músculo.

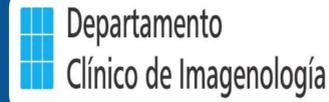


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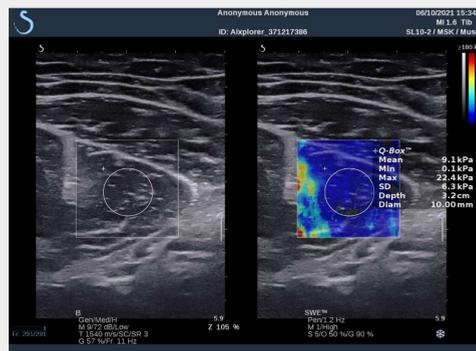


Introducción

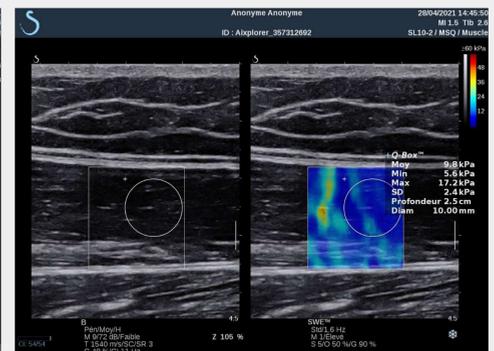
- Las lesiones musculares constituyen el 30 % de las patologías que afectan a deportistas. Afectan principalmente a grupos musculares de los muslos y pantorrillas generando en futbolistas un promedio de 90 días fuera de la competencia en una temporada.
- La elastografía por ultrasonido basada en ondas de cizalla (SWE Shear Wave Elastography) permite cuantificar el estado biomecánico muscular otorgando datos acerca no solo de la arquitectura muscular sino también del estado funcional del músculo, destacando su potencial para el estudio de lesiones en etapas preclínicas.
- En Uruguay el uso del SWE es reciente y actualmente no existe ninguna aplicación clínica validada para el uso en tejido musculoesquelético.
- Nuestro objetivo del trabajo de investigación es validar el uso clínico de la SWE en el tejido muscular.

Materiales y Métodos

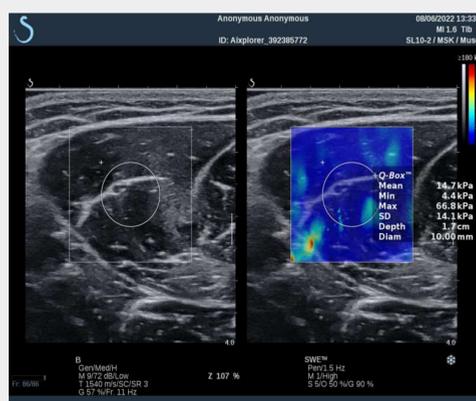
- Se utilizó un ecógrafo Aixplorer (Super Sonic Imagine) y transductor lineal de alta frecuencia.
- Los evaluadores fueron 2, uno con amplia experiencia en ecografía MSK y otro en formación.
- Se realizó un protocolo de estudio dirigido a 15 voluntarios sanos, de ambos sexos, entre 18 y 50 años, con un IMC menor a 25 y excluyendo aquellos que presentaran patologías neuromusculares.
- Se obtuvieron varias medidas de SWE en kPa en cada tercio (superior, medio e inferior) de los músculos bíceps femoral y recto anterior, tanto en corte transversal como longitudinal.
- Se pasaron las medidas a una planilla excel y se analizaron estadísticamente por medio de método de regresión lineal.



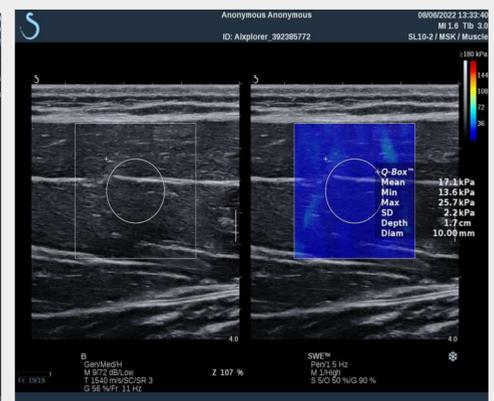
Cortes axiales a nivel de tercio medio de músculo recto anterior del cuádriceps, a izquierda en Modo B y a derecha con SWE (promedio de 6.3 kPa).



Cortes longitudinales a nivel de tercio medio de músculo recto anterior del cuádriceps, a izquierda en Modo B y a derecha con SWE (promedio de 2.4 kPa).



Cortes axiales a nivel de tercio medio de músculo bíceps femoral del isquiosural, a izquierda en Modo B y a derecha con SWE (promedio de 14.1 kPa).



Cortes longitudinales a nivel de tercio medio de músculo bíceps femoral del isquiosural, a izquierda en Modo B y a derecha con SWE (promedio de 2.2 kPa).

Resultados

- Se evaluó la confiabilidad del procedimiento calculando las medidas de variabilidad intraobservador (coeficiente de variación) e interobservador (coeficiente de correlación interclase y su intervalo de confianza al 95%).
- Se demostró una muy buena independencia del protocolo con el examinador.
- La mejor repetitividad entre examinadores se logró para el músculo recto anterior debido a su arquitectura menos compleja que el bíceps femoral.
- Actualmente se está aplicando este protocolo en futbolistas profesionales correlacionando con diferentes lesiones musculares.

Variabilidad intraobservador e interobservador

Intraclass Correlation	95% Confidence Interval		F-Test with True Value 0			
	Lower Bound	Upper Bound	Value	df1	df2	Sig.
.821	.774	.858	5.576	285	285	.000

Medida	Intraobservador	95% Confianza Interval	Interobservador
		Lower Bound	Upper Bound
Recto anterior			
Tercio sup medial transversal	Single Measures: .294	-.343	.887
Average Measures: .488	-.125	.882	
Tercio sup medio longitudinal	Single Measures: .289	-.183	.899
Average Measures: .489	-.153	.893	
Tercio sup lateral transversal	Single Measures: .272	-.185	.889
Average Measures: .488	-.126	.884	
Tercio sup medio longitudinal	Single Measures: .234	-.148	.884
Average Measures: .382	-.173	.872	
Tercio medio superior Transverso	Single Measures: .269	-.186	.883
Average Measures: .382	-.185	.882	
Tercio medio superior Longitudinal	Single Measures: .234	-.123	.883
Average Measures: .389	-.111	.876	
Tercio medio inferior Transverso	Single Measures: .261	-.141	.883
Average Measures: .382	-.188	.882	
Tercio medio inferior Longitudinal	Single Measures: .404	-.182	.793
Average Measures: .611	-.179	.886	
Tercio inferior Carga lateral	Single Measures: .404	-.182	.793
Average Measures: .611	-.179	.886	
Tercio inferior Carga medial	Single Measures: .384	-.183	.887
Average Measures: .588	-.184	.887	
Tercio inferior Carga lateral	Single Measures: .398	-.182	.886
Average Measures: .592	-.185	.889	
Tercio inferior Carga medial	Single Measures: .384	-.183	.887
Average Measures: .588	-.184	.887	
Tercio inferior Carga lateral	Single Measures: .384	-.183	.887
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