

Musculoskeletal ultrasound as an indicator of physical condition in oncological patients

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Abstract

Background and Aim In 2018, cancer survival (colorectal and breast cancer) rates at five years are estimated at 68%, which is very promising data, however this makes cancer a chronic disease. The illness itself and its treatment negatively affect muscle strength, functional capacity and body composition of these patients. This hampers the performance of activities of daily living, work and leisure. In recent years, ultrasound has evolved as being a useful, simple and innocuous tool to evaluate the muscle architecture in different groups of the population.

Thus, the aim of this study was to determine whether the muscle architecture of the quadriceps, measured using ultrasound, is associated with muscle strength, functional capacity and body composition in patients with cancer (colorectal and breast cancer) who have completed medical treatment.

Material and Methods A sample of 11 patients ($n=2$ breast cancer and $n=9$ colorectal cancer) were recruited from the University Hospital Virgen de las Nieves (Granada). An analytical, observational, cross-sectional study was performed in which the width of the quadriceps was assessed (distance between the upper border of the rectus femoris muscle and the superior margin of the femur) in a cross-sectional image using ultrasound (SAMSUNG, HM70A, Seoul, KR) in the dominant lower limb. Furthermore, we evaluated isokinetic muscle strength of knee extensors to $300^\circ/s$ and isometric muscle strength of the quadriceps using the dynamometer (Humac Norm, 502140, Stoughton, MA), functional capacity using the 6-minute walk test and the percentage of fat and musculoskeletal mass using bioelectrical impedance (InBody 720; Biospace, Seoul, KR). For the analyses, Pearson's correlation coefficients were used before adjusting by age and partial correlation coefficients adjusting by age using IBM SPSS Statistics 21 software (IBM Corporation, Armonk, NY).

Results The width of the quadriceps (mean \pm SD: 3.13 ± 0.57 cm) showed positive associations with isokinetic torque of extensors ($r= 0.693$), Q isometry ($r= 0.657$), musculoskeletal mass ($r= 0.518$), percentage of fat ($r= 0.338$) and functional capacity ($r= 0.606$); and negative associations with age ($r= -0.158$); although significance was only found for the isokinetic torque of extensors, quadriceps isometry and functional capacity ($P < 0.05$). The partial correlation of the isokinetic torque of extensors with the width of the quadriceps removing the effect of age was ($r= 0.686$, $P= 0.029$) and for quadriceps isometry ($r= 0.650$, $P= 0.042$). This partial correlation for functional capacity, removing the effect of age was $r= 0.593$ ($P= 0.071$).

Keywords

- ▶ neoplasia
- ▶ ultrasound
- ▶ muscle strength
- ▶ functional capacity

Conclusion Ultrasound can be a useful tool as an indicator of physical condition, in terms of strength of oncological patients. These findings support the use of ultrasound in the clinical context of oncological physical therapy as a possible method of functional assessment.