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Accurate Assessment of the Hill-Sachs Lesion: There Is No Information About the Accuracy of Quantification of These Lesions

Optimal assessment of a Hill-Sachs lesion is an important aspect of shoulder instability management, as it is shown to be associated with recurrent dislocations.[1] A Hill-Sachs lesion is present in >84% of patients after a first-time dislocation and >88% after recurrent dislocations.[2,3] Therefore, we read "Accuracy and Reliability of Imaging Modalities for the Diagnosis and Quantification of Hill-Sachs Lesions: A Systematic Review" by Vopat et al.[4] with great interest. The authors conclude that the studies in the review demonstrate acceptable accuracy with regard to both diagnosing and quantifying Hill-Sachs lesions. However, considering the importance of this subject, we would like to argue the strength of this conclusion.

In the systematic review, 2 components are evaluated: accuracy and reliability. A clinical test or measurement with high accuracy gives a value that is close to the actual value that an observer intends to measure. A test with a high reliability demonstrates the same value when the test is repeated under the same conditions. Therefore, a test with high reliability can still have low accuracy (when the outcome is not close to the actual value). A test that is both accurate and reliable is considered valid, and the best available test under reasonable conditions is considered the gold standard.

The authors showed that the included studies report only reliability for quantifying Hill-Sachs lesions on 2- and 3-dimensional computed tomography (2D-CT and 3D-CT) and magnetic resonance imaging and angiography (MRI and MRA) and do not report accuracy for any of these modalities. With regard to quantification of Hill-Sachs lesions, they showed that only the study by Cicak et al.[5] reported accuracy for quantification of Hill-Sachs lesions on ultrasound and radiography. However, the reported 97% accuracy for ultrasound and 84% accuracy for radiography are not for quantification but for detection of Hill-Sachs lesions, with surgical findings as the reference standard (which they used as a gold standard).[5] Hence, Cicak et al. did measure volume but did not determine accuracy for their measuring method. This may also be the reason Vopat et al.[4] found possible bias in the reference standard with the QUADAS-2 tool for the study. Therefore, none of the studies seem to report accuracy for quantification of Hill-Sachs lesions, and we believe the conclusion stating that different imaging modalities show acceptable accuracy in quantifying Hill-Sachs lesions cannot be drawn.

Measuring bony lesions can be difficult, as has recently been shown for measurement of bony Bankart lesions.[6] Vopat et al.[4] discuss that the literature confirms 3D-CT as the gold standard in quantifying humeral bone loss, which is shown to be the case for identifying these lesions. However, a gold standard for quantifying lesions should consist of a modality (such as 3D-CT) in combination with a measuring method. Methods that are currently available often use 2D measurements to measure 3D volume,[6] such as a line or a circle, which was also the case in the study by Cicak et al.[5] For bony Bankart lesions, these measurements are used to determine recurrence risk; however, this concept has been challenged, as these measurements are not proven to be accurate.[6,7] The size of bony lesions is associated with recurrence, and a proper quantification can therefore be important in determining recurrence risk,[1] for example, when determining whether a Hill-Sachs lesion is on or off track.[4] 2D measurements were not proven to be accurate in quantifying bony lesions, and we believe a 3D approach is most suitable to find an appropriate gold standard.[6,8]

In conclusion, we do not believe that current evidence demonstrates how Hill-Sachs lesions can be accurately measured. In our opinion, 3D measurements may be valuable in accurately measuring the volume and relevance of a Hill-Sachs lesion.

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Author Reply to "Accurate Assessment of the Hill-Sachs Lesion: There Is No Information About the Accuracy of Quantification of These Lesions"

We appreciate the comments from Verweij el al. regarding our manuscript, "Accuracy and Reliability of Imaging Modalities for the Diagnosis and Quantification of Hill–Sachs Lesions: A Systematic Review." The goal of this study was to assess the current literature on the diagnosis and identification of Hill–Sachs lesions. As our systematic review illustrates, there are only a few high-level studies that directly compare different imaging modalities in quantifying Hill–Sachs lesions. As such, we were limited to performing a systematic review in lieu of a meta-analysis. However, Verweij et al. are correct that Cusick et al.'s findings reported diagnosis and did not quantify Hill–Sachs lesions.[1] They are therefore accurate in stating that there is currently no study in the literature that establishes Hill–Sachs lesion assessment by ultrasound.

Verweij et al.[2] stated that 3-dimensional (3D) computed tomography has been shown to be the most accurate in evaluating bone loss. However, they concluded, analogous with our findings, that existing evidence on a superior imaging modality to assess its lesions is still lacking.[2] However, we have recently shown that 3D imaging is superior to 2-dimensional imaging.[3,4] Thus, we agree with Verweij et al. that 3D imaging is likely the "gold standard" in diagnosing, quantifying, and determining whether a Hill–Sachs lesion is truly "on" or "off" track.[2]

Lastly, although we believe that 3D computed tomography is the most reliable way to quantify these lesions, 3D magnetic resonance imaging has the potential to provide similar accurate information while decreasing cost and radiation exposure to the patient.[5,6] Future studies are still necessary to fully establish 3D magnetic resonance imaging as a viable assessment tool.

In summary, we agree with Verweij et al. and appreciate their comments as we all strive to find efficient, reliable, and safe methods to accurately quantify Hill–Sachs lesions.

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