

# ABER Position in Direct MR Arthrography of the Shoulder: Useful Adjunct or Waste of Imaging Time?

## Die ABER-Position bei der direkten MR-Arthrografie der Schulter: Sinnvolle Ergänzung oder Verschwendung von Messzeit?

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### Key words

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### ABSTRACT

**Purpose** The usefulness of direct MR arthrography of the shoulder with additional ABER position (ABER-MRA) has always been discussed. The goals of the following review are to analyze the usefulness of this technique according to the available literature and present recommendations with respect to indications and benefits in diagnostic imaging of shoulder abnormalities in the clinical routine.

**Method** For this review we assessed the current literature databases of the Cochrane Library, Embase, and PubMed with regard to MRA in the ABER position up to the February 28, 2022. Search terms were “shoulder MRA, ABER”, “MRI ABER”, “MR ABER”, “shoulder, abduction external rotation MRA”, “abduction external rotation MRI” and “ABER position”. The inclusion criteria were prospective and retrospective studies with surgical and/or arthroscopic correlation within 12 months.

Overall, 16 studies with 724 patients fulfilled the inclusion criteria: 10 studies dealing with anterior instabilities, three studies with posterior instabilities and seven studies with suspected rotator cuff pathologies (some studies addressing multiple items).

**Results** For anterior instability the use of ABER-MRA in the ABER position led to a significant increase in sensitivity for detecting lesions of the labral ligamentous complex compared with standard 3-plane shoulder MRA (81 % versus 92 %,  $p = 0.001$ ) while maintaining high specificity (96 %). ABER-MRA demonstrated high sensitivity and specificity (89 % and 100 %, respectively) for SLAP lesions and was able to detect micro-instability in overhead athletes, but case counts are still very small. With regard to rotator cuff tears, no improvement of sensitivity or specificity could be shown with use of ABER-MRA.

**Conclusion** Based on the currently available literature, ABER-MRA achieves a level of evidence C in the detection of pathologies of the anteroinferior labroligamentous complex. With regard to the evaluation of SLAP lesions and the exact determination of the degree of rotator cuff injury, ABER-MRA can be of additive value, but is still a case-by-case decision.

### Key Points:

- ABER-MRA is useful in the evaluation of pathologies of the anteroinferior labroligamentous complex
- ABER-MRA does not increase sensitivity or specificity with regard to rotator cuff tears
- ABER-MRA may be helpful for the detection of SLAP lesions and micro-instability in overhead athletes

### Citation Format

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### ZUSAMMENFASSUNG

**Hintergrund** Die direkte MR-Arthrografie in ABER-Position (ABER-MRA) ist ein viel diskutiertes und nicht unumstrittenes Thema. Ziel der Arbeit ist die Aufarbeitung der soweit zugänglichen Studien über den Einsatz der ABER-MRA, um über eine Expertenmeinung hinausgehende Indikationsgebiete klarer definieren zu können.

**Methode** Für die für diese Übersicht durchgeführte Literaturrecherche wurden die zugänglichen Datenbanken von Cochrane Library, Embase und Pubmed auf folgende Suchbegriffe überprüft: „shoulder MRA, ABER“, „MRI ABER“, „MR ABER“, „shoulder, abduction external rotation MRA“, „abduction external rotation MRI“ und „ABER position“. Inkludiert wurden sowohl prospektive als auch retrospektive Studien mit einer arthroskopischen oder offen operativen Korrelation nicht später als 12 Monate nach der MRA. Stichtag für die Datenerhebung war der 29.02.2022. 16 Studien mit insgesamt 724 Patienten erfüllten die Einschlusskriterien: 10 Studien zu anterioren Instabilitäten, 3 Studien zu posterioren Instabilitäten und 7 Studien zu Pathologien der Rotatorenmanschette (einige Studien mehrfach berücksichtigt).

**Ergebnisse** Die Anwendung der ABER-MRA zur Abklärung des anteroinferioren labroligamentären Komplexes führte zu einer signifikanten Zunahme der Sensitivität verglichen mit der Standard-MRA (81 % versus 92 %,  $p = 0,001$ ) bei gleich-

bleibend hoher Spezifität (96 %). Die ABER-MRA zeigt eine hohe Sensitivität (89 %) und Spezifität (100 %) zur Abklärung von SLAP-Läsionen und ist in der Lage, Mikroinstabilitäten bei Überkopfsportlern zu detektieren. Mit Blick auf Verletzungen der Rotatorenmanschette kann keine Verbesserung von Sensitivität oder Spezifität durch Hinzuziehung der ABER-MRA erzielt werden.

**Schlussfolgerung** Die Datenlage über den diagnostischen Zugewinn der direkten MR-Arthrographie in ABER-Position ist nach wie vor limitiert. Bei einem Evidenzlevel C ist ihr Einsatz zur Klärung einer Pathologie des anteroinferioren labroligamentären Komplexes sinnvoll. Für die Beurteilung des posterosuperioren Labrums sowie die Beurteilung der Rotatorenmanschette kann die MRT in ABER-Position, insbesondere für die Beurteilung von SLAP-Läsionen sowie für die Bestimmung des Rupturmaßes sinnvoll sein, stellt jedoch immer noch eine Einzelfallentscheidung dar.

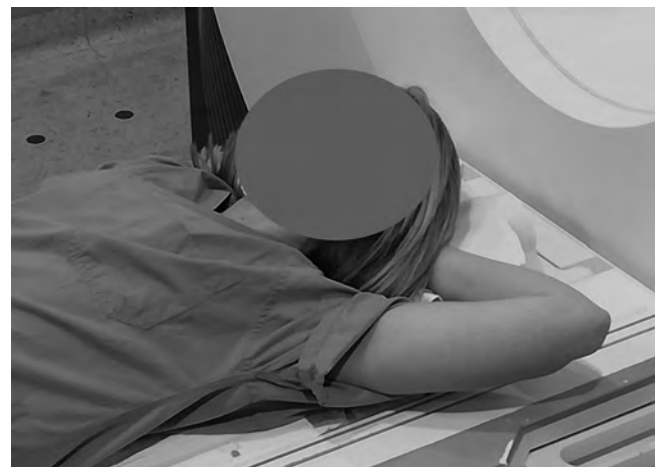
## Background

The shoulder joint is the most mobile joint in the human body and is thus susceptible to injury and degeneration. This is favored by the size difference between the articulating joint surfaces and by the fact that the joint is predominantly reinforced by soft-tissue structures. Injuries and damage to the shoulder joint range from instability and lesions of the superior labrum to diseases of the rotator cuff and the subacromial joint, and pathologies of the acromion and acromioclavicular joint. Shoulder issues can occur at almost any age. Despite the increasing availability of joint ultrasonography, the shoulder is the second most commonly examined joint after the knee by MR imaging due to its excellent visualization of both bony and soft-tissue structures [1].

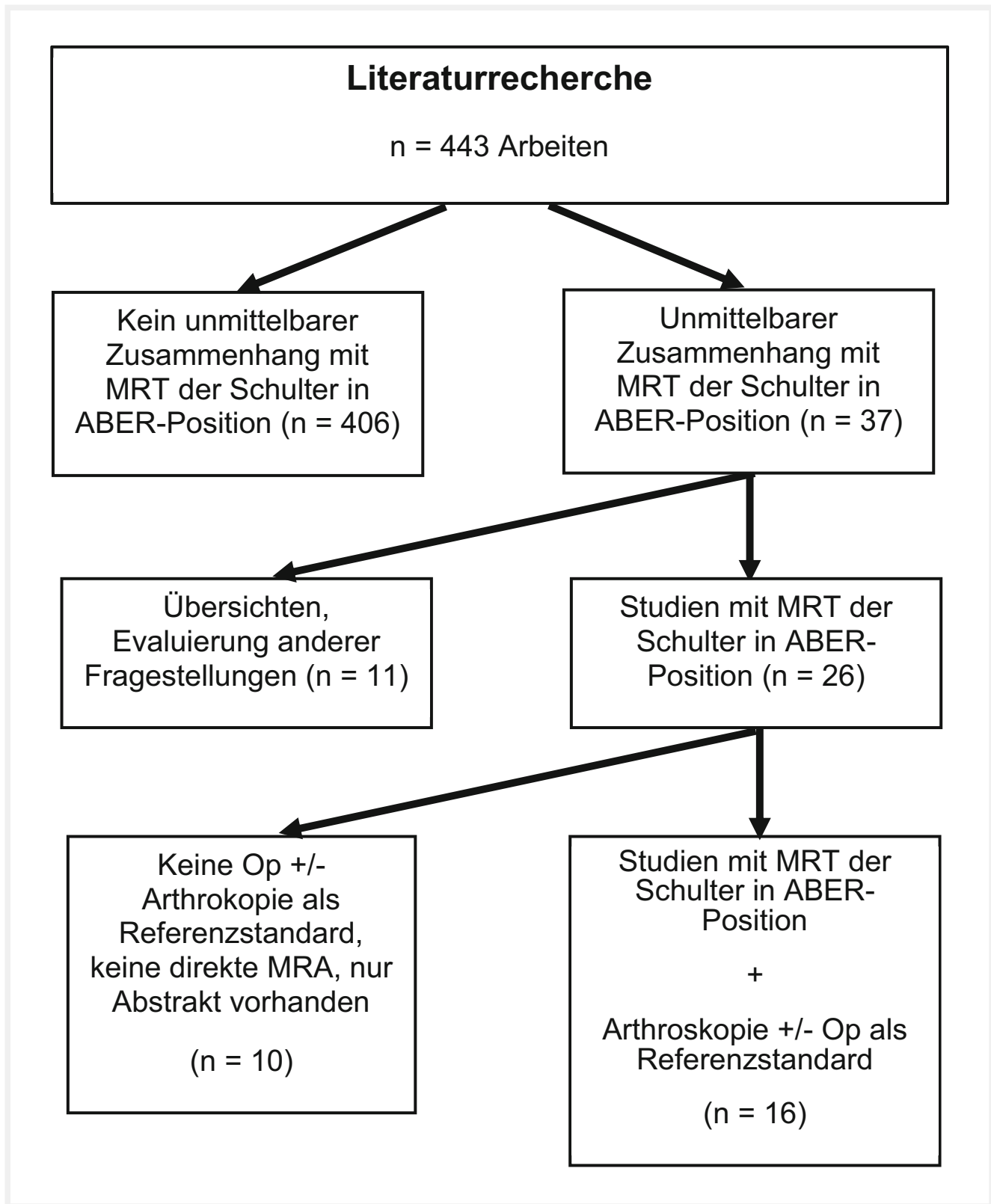
Due to the complex anatomical structure of the shoulder, direct MR arthrography was an early examination method. Meta-analyses regarding the accuracy of non-contrast MRI compared to direct MR arthrography showed significant advantages of direct MR arthrography in the diagnosis of lesions of the anteroinferior glenoid labrum, in the identification of SLAP lesions, and in the diagnosis of articular-sided and interstitial non-transtendinous ruptures of the rotator cuff. This was also able to be shown in a meta-analysis with respect to the detection of labral lesions in examinations performed at 3 Tesla [2–5].

The additional examination of patients with the arm in the ABER (**abduction external rotation**) position has been repeatedly discussed in combination with direct MR arthrography. In examinations in the ABER position, the palm is positioned under the head so that the upper arm is at an angle of approximately 90° with respect to the torso (► **Fig. 1**). The examination is planned on a coronal overview parallel to the humeral shaft so that the scan orientation runs from dorso-cranial to ventral anterior through the glenoid [6]. Consequently, the acquisition of images in the ABER position is always associated with a not insignificant additional time expenditure due to the repositioning of the pa-

tient and the typically required switching from a dedicated shoulder coil to a flexible, usually multi-channel body coil. However, in the protocol recommendations of the Musculoskeletal Radiology Working Group of the German Radiological Society as well as in the recommendations of the German Society for Musculoskeletal Radiology (DGMSR), an examination in the ABER position is considered useful in the following cases: clarification of a primary atraumatic instability and determination of the extent to which additional detachment of the labrum is present in the case of an anterior-inferior labral lesion. This additional examination is also recommended in the case of unclear findings regarding the posterior labrum, particularly in the case of sports-related injuries and for identifying a posterosuperior impingement with lesions of the posterosuperior labrum, ventral joint capsule, and posterosuperior rotator cuff [7, 8]



► **Fig. 1** Patient positioning for examination in ABER position: the palm pointing up is positioned under the head of the patient. This additionally stabilizes the shoulder. For signal detection, a flexible multichannel coil can be used.



► Fig. 2 Flow chart.

► **Table 1** Characteristics of included studies.

Author	Year	Study design	Field strength	Reference standard	Number of patients
Tirman PFJ	1994	Case control study, retrospective	1.5 T	Arthroscopy	5
Cvitanić O	1997	Cross-sectional study, multicenter, prospective	1.5 T	Arthroscopy, Open surgery	92
Roger B	1999	Cross-sectional study, retrospective	1.0 T	Arthroscopy	17
Wischer TK	2002	Case control study, retrospective	1.5 T	Arthroscopy	10
Sugimoto H	2002	Cross-sectional study, prospective	1.0 T	Arthroscopy	30
Lee SY	2002	Case control study, retrospective	1.5 T	Arthroscopy	16
Ng AWH	2009	Cross-sectional study, retrospective	1.0 T	Open surgery	16
Sheah K	2009	Cross-sectional study, retrospective	1.5 T, 3 T	Arthroscopy, Open surgery	54
Schreinemakers SA	2009	Cross-sectional study, retrospective	1.0 T, 1.5 T	Arthroscopy	92
Schreinemakers SA	2009	Cross-sectional study, retrospective	1.0 T, 1.5 T	Arthroscopy	92
Jung J-Y	2010	Cross-sectional study, retrospective	1.5 T	Arthroscopy	22
Borrero CG	2010	Cross-sectional study, retrospective	1.5 T	Arthroscopy	63
Modi CS	2013	Cross-sectional study, retrospective	3 T	Arthroscopy	25
Tian C-Y	2013	Cross-sectional study, retrospective	3 T	Arthroscopy	164
Iossifidis A	2020	Cross-sectional study, retrospective	1.5 T	Arthroscopy	80
Wahdan AA	2021	Cross-sectional study, retrospective	Not specified	Arthroscopy	38

The goal of the present study is to analyze the usefulness of this technique according to the available literature and present recommendations with respect to indications and benefits in diagnostic imaging of shoulder abnormalities in the clinical routine.

## Materials and Methods

### Research strategy and inclusion criteria

The databases of the Cochrane Library, Embase, and PubMed were used for the literature search. The search terms “shoulder MRA, ABER”, “MRI ABER”, “MR ABER”, “shoulder, abduction external rotation MRA”, “abduction external rotation MRI” and “ABER position” were used. In addition, the sources in the bibliographies of these studies were examined to identify further possible publications. The search was last updated on February 28, 2022.

The inclusion criteria for further analysis were prospective as well as retrospective studies in which direct MR arthrography was used as an additional examination in the ABER position to clarify a pathology of the shoulder joint. Moreover, arthroscopic or open surgical control of the finding performed within 12 months was also required. The study needed to be written in German or English. The field strength of the MR devices was irrelevant. Duplicate publications and publications in which classification of the data as true-positive, true-negative, false-positive, and false-negative findings was not possible were also not taken into consideration.

In total, 443 studies were identified and reviewed. There was no direct connection with MR arthrography in the ABER position (MRA-ABER) in  $n = 406$  studies. Another 11 studies were either review articles or studies that did not address the results of MR

arthrography in the ABER position in greater detail. In addition, one already published study on the detection rate and evaluation of rotator cuff ruptures was not taken into consideration since it turned out to be a duplicate publication and was retracted by the responsible publisher [9, 10]. Among the remaining 26 studies, there was no arthroscopic or surgical control of the findings or only an abstract in 8 studies. Moreover, no data regarding the general sensitivity and specificity of normal MR arthrography and the ABER position could be extracted from one study on the characterization of labroligamentous lesions [11–18] so that ultimately 16 studies were able to be included in the present study [19–34] (► Fig. 2).

### Data extraction

Two evaluators examined the selected studies regarding study type and design, examined pathologies, and anatomical structures (e. g., anteroinferior capsulolabral complex, superior labrum, rotator cuff). In addition to recording the number of patients and the time since surgical/arthroscopic control, the results were examined to determine the extent to which a differentiation between the results of conventional MR arthrography and the additional information acquired from the examination in the ABER position either alone or in combination with normal MR arthrography was possible. Based on this, the results were classified according to sensitivity and specificity to the extent possible. Multiple evaluations were taken into further analysis in their full scope [26–28, 32].

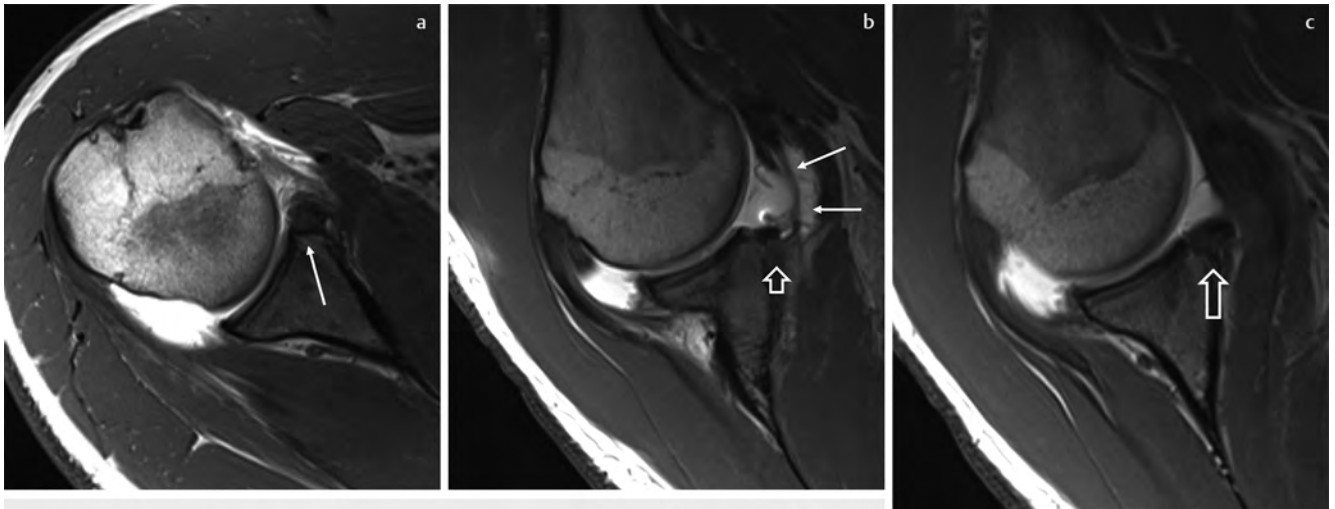
► **Table 2** Results of MR arthrography in the ABER position in patients with glenohumeral instabilities in comparison with conventional MR arthrography.

Author [year]	Patients [n]	Evaluated structure	Sensitivity MR arthrography	Specificity MR arthrography	Sensitivity MRA-ABER alone	Specificity MRA-ABER alone	Sensitivity MRA-ABER combined	Specificity MRA-ABER combined
<b>Preoperative imaging</b>								
Wahdan AA [2021]	38	Anteroinferior labrum	23/26 [88%]	11/12 [92%]			26/26 [100%]	12/12 [100%]
Iossifidis A [2020]	80	Anteroinferior labrum					69/73 [94%]	6/7 [86%]
Tian et al. [2013] <sup>1</sup>	164	Anteroinferior labroligamentous complex	272/330 [82%]	124/128 [97%]	303/330 [94%]	119/128 [93%]		
Modi et al. [2013]	78 MRA 25 MRA-ABER	Lesions of the acetabular rim	34/48 [71%]	29/30 [97%]	-	-	15/16 [94%]	8/9 [89%]
Schreine-machers et al. [2009] <sup>2</sup>	92	Anteroinferior labroligamentous complex	130/141 [92%]	116/135 [86%]	119/141 [84%]	118/135 [87%]		
Modi et al. [2009]	16	Anteroinferior joint capsule	-	-	-	-	11/13 [85%]	3/3 [100%]
Wischer et al. [2002]	10	Anteroinferior labrum Perthes lesion	10/10 [100%] 0/10 [0%]				10/10 [100%] 5/10 [50%]	
Roger et al. [1999]	17	Anterior labrum and anterior band of the IGHL	6/9 [67%]	-	-	-	8/9 [89%]	
Cvitanic et al. [1997]	92	Anteroinferior labrum	13/27 [48%]	59/65 [91%]	24/27 [89%]	62/65 [96%]	26/27 [96%]	63/65 [97%]
Cumulative dataset	587 MRA 534 MRA-ABER	Anteroinferior labroligamentous complex	488/601 [81%]	339/370 [92%]	446/498 [90%]	299/328 [91%]	170/184 [92%]	92/96 [96%]
<b>Postoperative imaging</b>								
Sugimoto et al. [2002]	30	Postoperative refixation of the acetabular rim (n = 98 sutures)					23/28 [82%] loose sutures	70/70 [100%] intact sutures

IGHL = inferior glenohumeral ligament.

<sup>1</sup> pooled sensitivities and specificities, 2 observers.

<sup>2</sup> pooled sensitivities and specificities, 3 observers.



► **Fig. 3** 18-year-old patient with sensation of instability. Direct MR arthrography, T1-weighted TSE images with fat suppression. **a** The axial image displays a thickened and rounded ventral labrum without any further injury of the capsuloligamentous complex (arrow). **b** and **c**: In the ABER position there is a mediocaudal displacement of the labrum (arrowhead) and laxity of the ventral joint capsule (arrows).



► **Fig. 4** 19-year-old patient after first shoulder dislocation; T1-weighted TSE images. **a** The axial image shows a suspicious lesion at the capsuloligamentous complex (arrow). **b** The ABER position shows an intact anterior labrum and a tight anterior joint capsule without any sign of injury (arrows).

### Statistics

The software SPSS Statistics (V25, IBM Corp.) was used for statistical evaluation. Continuous variables were presented as mean  $\pm$  standard deviation in the case of normal distribution. In the case of a lack of normal distribution, the median and interquartile range were specified. If not otherwise specified, categorical variables were presented as frequency or percentage.

A descriptive representation of the method heterogeneity between the studies was provided in a table.

After categorization, pooled sensitivities and specificities were calculated. The significance test for ordinal-scale and nominal-scale data was performed using the Chi-squared test. A p-value  $< 0.05$  was considered to be significant on a local level.

Considering the partially low number of cases and the overall low number of publications, estimators were not included due to

▶ **Table 3** Results of MR arthrography in the ABER position in patients with SLAP lesions in comparison with conventional MR arthrography.

Author [year]	Patients [n]	Evaluated structure(s)	Sensitivity MR arthrography	Specificity MR arthrography	Sensitivity MRA-ABER alone	Specificity MRA-ABER alone	Sensitivity MRA-ABER combined	Specificity MRA-ABER combined
Modi et al. [2013]	78 MRA 25 MRA-ABER	Superior labrum	7/14 [50%]	64/64 [100%]	3/3 [100%]	22/22 [100%]	-	-
Borrero et al. [2010]	63	SLAP lesion	5/10 [50%]	53/53 [100%]	10/10 [100%]	53/53 [100%]	-	-
Borrero et al. [2010]	63	Peel back of the posterosuperior labrum	-	-	50/68 [74%]	58/58 [100%]	-	-
Roger et al. [1999]	17	Posterosuperior labrum	13/15 [50%]	-	12/15 [80%]	-	-	-
<b>Cumulative data SLAP lesion</b>	158 MRA 105 MRA-ABER	Posterosuperior labrum	25/39 [71%]	117/117 [100%]	75/96 [89%]	133/133 [100%]	-	-

the statistical heterogeneity and publication bias was not taken into consideration.

## Results

Analysis of the studies available to date shows that most of them are retrospective evaluations from one center and there is a selection bias in most cases. To date, there is only one prospective multicenter study including 92 patients on the value of the ABER position for detecting lesions of the anterior labrum [20].

MR arthrography was performed using a **magnetic field strength** between 1.0 and 3.0 T, with most patients being examined at 1.5 or 3 T [19, 20, 22, 24, 26–33]. Arthroscopic results or results from open surgery are available in 724 patients: one collective with n = 92 patients was published twice, one time regarding the detection of anteroinferior labroligamentous injuries and one time regarding the detection of ruptures of the rotator cuff [27, 28]. ▶ **Table 1** shows an overview of the characteristics of the studies included in the data analysis.

In total, there were 10 studies examining the accuracy of MR arthrography in lesions of the anteroinferior labroligamentous complex and/or the acetabular rim in n = 540 patients (▶ **Table 2**) [20–22, 25, 27, 31–34]. The use of the ABER position resulted in a significant increase in the sensitivity of MR arthrography compared to conventional arthrography (▶ **Fig. 3**). This applies both to the sole evaluation of images in the ABER position as well as to the combined evaluation of conventional MR arthrography examinations together with images in the ABER position ( $p < 0.001$ ). The use of the ABER position did not result in a decrease in specificity but rather combined evaluation of conventional images together with ABER images increased specificity to 97% (▶ **Fig. 4**). Due to the limited number of cases, a level of significance was not reached ( $p = 0.09$ ).

There is only one study including 30 patients regarding the use of the ABER position in the postoperative evaluation of reinsertion of the capsulolabral complex [23]. Compared to the arthroscopic finding, MRA in the ABER position achieved an accuracy of 95% regarding the detection of intact sutures for reattaching the detached capsulolabral complex (▶ **Table 2**).

For the evaluation of the superior and posterosuperior labrum, only minimal data with arthroscopic/surgical control is currently available (▶ **Table 3**) [21, 30, 31]. Although the additional use of the ABER position has a higher sensitivity for the detection of SLAP lesions and lesions of the posterosuperior labrum, the difference is not significant ( $p = 0.092$ ). However, the peel-back mechanism in microinstability in overhead athletes could only be detected by examination in the ABER position.

With respect to the sensitivity for detecting transtendinous and non-transtendinous ruptures of the rotator cuff, particularly the tendons of the supraspinatus and infraspinatus muscles, the pooled results of the present studies [20, 25, 27, 28, 30] do not show any advantage from using the ABER position ( $p = 0.067$ ) (▶ **Table 4**). With respect to specificity, conventional MR arthrography performed significantly better than the sole or supplementary use of the ABER position ( $p < 0.001$ ). However, particularly in the case of non-transtendinous ruptures, the extent or

▶ <b>Table 4</b> Results of MR arthrography in the ABER position in patients with rotator cuff lesions in comparison with conventional MR arthrography.									
Author [year]	Patients [n]	Evaluated structure(s)	Sensitivity MR arthrography	Specificity MR arthrography	Sensitivity MRA-ABER alone	Specificity MRA-ABER alone	Sensitivity MRA-ABER combined	Specificity MRA-ABER combined	
Modi et al. [2013]	78 MRA 25 MRA-ABER	RMR, transtendinous, non-transtendinous	8/12 [75 %]	65/66 [98 %]	0/1 [0 %]	23/24 [96 %]	–	–	
Jung et al. [2010]	22	SSP rupture Non-transtendinous	20/24 [83 %]	17/20 [85 %]	–	–	22/24 [92 %]	15/20 [75 %]	
Schreine-machers et al. [2009] <sup>1</sup>	92	SSP rupture Transtendinous/ non-transtendinous	42/72 [58 %]	193/204 [95 %]	38/72 [53 %]	178/204 [87 %]	–	–	
Sheah et al. [2009] <sup>1</sup>	54	SSP, ISP rupture: Transtendinous/ non-transtendinous	42/46 [91 %]	61/62 [98 %]	29/42 [69 %]	50/62 [81 %]	–	–	
Roger et al. [1999]	17	RM ruptures	25/29 [86 %]	–	29/29 [100 %]	–	–	–	
Cumulative dataset	263 MRA 210 ER	Rotator cuff	137/183 [75 %]	336/352 [95 %]	96/144 [67 %]	251/290 [87 %]	22/24 [92 %]	15/20 [75 %]	
Lee et al. [2002]	16	Horizontal component, non-transtendinous SSP rupture	5/24 [21 %]	n. a.	24/24 [100 %]	n. a.	–	–	
Timman et al. [1994]	5	Supraspinatus muscle, extent of rupture	2/3 [67 %]	2/2 [100 %]	3/3 [100 %]	2/2 [100 %]	–	–	

<sup>1</sup> pooled sensitivities and specificities, 2 observers.



the horizontal component of the rupture could be better determined, and delamination of the tendons was documented more frequently [18, 23].

## Discussion

The benefit of the ABER position in direct MR arthrography of the shoulder to clarify lesions of the anteroinferior capsulolabral complex and for improved detection of SLAP lesions, non-transtendinous ruptures of the rotator cuff, and lesions of the posterosuperior labrum in the case of posterosuperior impingement has repeatedly been a topic of discussion [13, 20, 31, 32, 35]. The present review of published studies with arthroscopic or open surgical control of the finding shows that the use of the ABER position results in a significant improvement in the sensitivity for the detection of a lesion of the anteroinferior capsulolabral complex. This was able to be documented very clearly in a recently published meta-analysis [36]. The analysis of the quality of the present studies showed selection and reference bias to varying degrees among all studies (e.g. consideration only of patients with repeated shoulder luxation, restriction to athletes, preoperative knowledge of the imaging result, no data regarding the blinding of the surgeon, etc.) [37]. Further factors lowering the quality of the studies were the lack of prospective consecutive data acquisition, the case control study design, unclear study exclusion criteria, a retrospective study design, monocentric study, etc. [20–22, 25, 27, 31–34].

Examination in the ABER position is further capable of determining the extent of laxity of the joint capsule. This is also referred to as the crescent sign and is seen as an enlarged and elongated capsule in a functional position (► **Fig. 3b**). This is also observed in joints with multidirectional instability compared with stable joints [18].

The available data regarding the use of the ABER position in the workup of the posterosuperior labrum and lesions of the rotator cuff is still very limited. There was a diagnostic gain particularly in the case of lesions of the posterosuperior labrum with lesions on the underside of the rotator cuff [30].

However, the use of the ABER position does not result in improved detection of lesions of the RM (transtendinous and non-transtendinous ruptures of the supraspinatus and infraspinatus tendons) [20, 25, 27, 28, 30]. However, MRA in the ABER position can be useful in targeted situations like quantification of the extent of a non-transtendinous rupture and detection of the horizontal component of the rupture or delamination of tendons [18, 23].

Prior to integration of the ABER position in a routine examination protocol for MR arthrography of the shoulder, it is necessary to be aware of the longer imaging time. The imaging time is extended by 5 minutes or by 25 % of the time of a routine protocol [6, 38]. In addition, the reporting physician should be familiar with image interpretation. ABER image training resulted in improved diagnosis of lesions of the ventral labrum and – regardless of the level of experience of the reporting radiologist – in an increase in the level of trust in the report [38, 39].

The present review article shows that regarding the preoperative detection of a lesion of the anteroinferior labroligamentous complex, the recommendation for performing MR arthrography in the ABER position is far beyond an expert opinion. Due to the quality of the currently available studies (mostly smaller retrospective studies, high selection bias and reference bias), the evidence level is C [40]. The improved sensitivity and specificity achieved with the use of the ABER position justify a class I recommendation for this indication.

With respect to the use of MRA in the ABER position to evaluate the posterosuperior complex and to evaluate the rotator cuff, the available data is thin and can also be categorized as evidence level C. There are only individual studies with very low case numbers regarding its use in the evaluation of the posterosuperior labrum. However, there is a tendency toward improved diagnosis using MRA in the ABER position, particularly for detecting SLAP lesions. Therefore, a class IIa recommendation could be made for this indication.

With regard to the detection of transtendinous and non-transtendinous ruptures of the tendons of the supraspinatus and infraspinatus muscles, use of the ABER position does not result in a diagnostic gain. However, MRA in the ABER position can be useful in targeted situations like quantification of the extent of a non-transtendinous rupture and precise detection of the horizontal component of the rupture or delamination of the tendons, so that this can be classified as an expert opinion.

## Conclusion

The currently available data regarding the diagnostic gain from the use of direct MR arthrography in the ABER position is still limited. With evidence level C, it is useful for the clarification of a pathology of the anteroinferior labroligamentous complex. For the diagnosis of lesions of the posterosuperior labrum and the rotator cuff, MRI in the ABER position can be useful particularly for the evaluation of SLAP lesions and for the determination of the extent of the rupture of the rotator cuff, but a decision must be made in each individual case.

## Conflict of Interest

The authors declare that they have no conflict of interest.

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