

**Hip dysplasia:
update searches and screening
for
Universitätsklinikum Schleswig-Holstein/Campus Kiel**



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November 2021

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1. PROJECT OBJECTIVES

A key aim of the research project “Making SDM a reality” is to inform patients as part of shared decision making (SDM).

Kleijnen Systematic Reviews (KSR) Ltd has prepared an evidence report with a synthesis of the evidence for hip replacement dysplasia.

2. METHODS

LITERATURE SEARCHES

Literature searches were conducted to identify systematic reviews and evidence-based guidelines about Hip Dysplasia to update the 2019 evidence report.

The search strategies were developed specifically for each database and the keywords adapted according to the configuration of each database. Searches were limited by date range for systematic reviews and guidelines to 2019-2021. Searches were not limited by language or publication status.

Systematic reviews and guidelines

The following systematic review and health technology assessment specific databases were searched:

- Cochrane Database of Systematic Reviews (CDSR) (Wiley): 2019-2021/09/Iss9
- KSR Evidence (Internet) (<https://ksrevidence.com/>): 2019-2021.9.30
- Epistemonikos (Internet) (<https://www.epistemonikos.org/>): 2019-2021/09/30
- International HTA Database (INAHTA) (<https://database.inahta.org/>): 2019-2021/10/5

The following guidelines resources were searched:

- Guidelines International Network (GIN) (Internet) (<https://www.g-i-n.net/home>): 2019-2021/09/30
- NICE Evidence (Internet) (www.evidence.nhs.uk/): 2019-2021/09/30
- NICE Guidance (Internet) (<https://www.nice.org.uk/guidance>): 2019-2021/09/30
- ECRI Guidelines Trust (Internet) (<https://guidelines.ecri.org/>): 2019-2021/09/30
- Trip Database (<https://www.tripdatabase.com/>): 2019-2021/10/5
- Canadian Agency for Drugs and Technologies in Health (CADTH) (www.cadth.ca): 2019-2021/10/5

Full details of all search strategies are presented in Appendix 1.

Handling of citations

References identified from the searches were downloaded into EndNote bibliographic management software for further assessment and handling.

Supplementary searches

The bibliographies of included studies and review articles were also checked for additional relevant articles.

Prioritisation

During formal screening of titles and abstracts, studies were subject to a prioritisation process whereby the recency e.g., to most up-to-date clinical practice guidelines (CPG), methodological quality e.g., Cochrane systematic review (CSR), quality of the analyses per outcome (e.g., ratio of RCTs to observational studies), the number of included RCTs, the breadth of the timepoints reported etc. were considered to further prioritise which studies would be used to inform analyses. Studies were categorised into the following three categories: '1' = German, American, European or similar CPG; '2' = CSR or similar quality SR; '3' = potentially lower/other quality SR.

3. RESULTS

The original KSR searches were conducted on January 17, 2019; and of the 54 references screened, 22 studies were deemed eligible. In the current update, a total of 159 records were retrieved from the electronic literature searches (Appendix 1). After the removal of duplicate records 118 titles and abstracts were screened by two reviewers. Sixteen records were found to be potentially eligible and were longlisted after a consensus. Of those, five were short-listed and included in the analyses (Table 1).¹⁻⁵ See also Table 2 for an overview of primary studies included in the identified SRs.

UPDATE – Concluding Assessment by SHARE-TO-CARE Evidence Team (29/09/22)

Based on the update searches conducted by KSR Ltd in October 2021, we want to highlight the following aspects: randomised control trials are still warranted to confirm the best device/treatment options for developmental hip dysplasia. The newly identified systematic reviews are in line with the evidence report (2019).

Conclusion regarding the evidence report: No evidence update required. The present evidence report (September 17, 2019) remains valid until further notice.

Table 1 Evidence sources

Study/year	Evidence type	Primary studies	Number of studies	Intervention(s)	Comparator(s)	Outcome(s)	Date searched	Conclusions
Pavone 2021 ¹	SR	OS	19	Dynamic splinting	Static brace	Treatment success/failure	N/M	Dynamic splinting for developmental hip dysplasia represents a valid therapeutic option in cases of instability and dislocation, especially if applied within 4–5 months of life.
Zhi 2021 ²	SR	OS	8	Tübingen hip flexion splint	Pavlik harness	Successful treatment , complications	July 31, 2020	Tübingen hip flexion splint may be an effective treatment option for developmental hip dysplasia among infants less than six months of age
Ashoor 2021 ³	SR	OS	30	The Pavlik harness	The Von Rosen splint, the Tübingen brace, the Frejka pillow, the Aberdeen splint	Treatment failure	2018	The review findings should be interpreted with caution as there are substantive flaws in the literature and a randomized control trial is warranted to confirm the best device to treat developmental hip dysplasia.
Tejpal 2020 ⁴	SR	OS	27	Salter's innominate osteotomy	Non-surgical treatment	Radiographic or clinical outcomes	October 9, 2018	This review found that Salter's innominate osteotomies for developmental dysplasia of the hip produces generally good post-operative clinical outcomes.
Merckaert 2021 ⁵	SR	OS	48	Salter's innominate osteotomy	Pemberton's pericapsular osteotomy, Dega's	Radiographic or clinical outcomes	N/M	Even if our review demonstrates slightly better radiological and clinical results

Study/year	Evidence type	Primary studies	Number of studies	Intervention(s)	Comparator(s)	Outcome(s)	Date searched	Conclusions
					acetabuloplasty			with the Pemberton's pericapsular osteotomy, the currently available and limited data do not allow for clear recommendation towards one of these techniques.
N/M = not mentioned; OS = observational study; SR = systematic review.								

Table 2 Overview of primary studies included in the identified SRs/CPGs

Study/year	Primary study(ies)	Reference (first author & journal)
Pavone 2021 ¹	SR, OS*	1. Kubo, H.; Pilge, H.; Weimann-Stahlschmidt, K.; Stefanovska, K.; Westhoff, B.; Krauspe, R. Use of the Tübingen splint for the initial management of severely dysplastic and unstable hips in newborns with DDH: An alternative to Fettweis plaster and Pavlik harness. Arch. Orthop. Trauma Surg. 2018, 138, 149–153. 2. Dwan, K.; Kirkham, J.; Paton, R.W.; Morley, E.; Newton, A.W.; Perry, D.C. Splinting for the non-operative management of developmental dysplasia of the hip (DDH) in children under six months of age. Coch. Data. Syst. Rev. 2017, 7, CD012717. 3. Novais, E.N.; Kestel, L.A.; Carry, P.M.; Meyers, M.L. Higher Pavlik harness treatment failure is seen in Graf type IV ortolanipositive hips in males. Clin. Orthop. Relat. Res. 2016, 474, 1847–1854.
Zhi 2021 ²	OS*	1. Kubo H, Pilge H, Weimann-Stahlschmidt K, et al. Use of the Tübingen splint for the initial management of severely dysplastic and unstable hips in newborns with DDH: an alternative to Fettweis plaster and Pavlik harness. Arch Orthop Trauma Surg 2018;138:149-153. 2. Zhou Y, Li R, Li C, et al. Tübingen hip flexion splints for developmental dysplasia of the hip in infants aged 0-6 months. BMC Pediatr 2020;20:280 3. 20. Kubo H, Pilge H, Nepp K, Westhoff B, Krauspe R. Development of unstable hips after treatment with the Tübingen splint: mid-term follow-up of 83 hip joints. Arch Orthop Trauma Surg 2018;138:629-634. 4. Ran L, Chen H, Pan Y, et al. Comparison between the Pavlik harness and the Tübingen hip flexion splint for the early treatment of developmental dysplasia of the hip. J Pediatr Orthop 2020;29:424-430.

Study/year	Primary study(ies)	Reference (first author & journal)
		5. Yegen M, Atalar H, Gunay C, et al. Reduction of the dislocated hips with the Tübingen hip flexion splint in infants. <i>Int Orthop</i> 2019;43:2099-2103
Ashoor 2021 ³	OS*	1. Kubo H, Pilge H, Weimann-Stahlschmidt K, Stefanovska K, Westhoff B, Krauspe R. Use of the Tübingen splint for the initial management of severely dysplastic and unstable hips in newborns with DDH: an alternative to Fettweis plaster and Pavlik harness. <i>Arch Orthop Trauma Surg</i> 2018;138(2):149e53. 2. Kubo H, Pilge H, Nepp K, Westhoff B, Krauspe R. Development of unstable hips after treatment with the Tübingen splint: mid-term follow-up of 83 hip joints. <i>Arch Orthop Trauma Surg</i> 2018;138(5):629e34. 3. Yegen M, Atalar H, Gunay C, Yavuz OY, Uras I, Kaptan AY. Reduction of the dislocated hips with the Tübingen hip flexion splint in infants. <i>Int Orthop</i> 2019 Sep;43(9):2099e103.
Tejpal 2020 ⁴	OS*	1. Wang CW, Wang TM, Wu KW et al. The comparative, long-term effect of the Salter osteotomy and Pemberton acetabuloplasty on pelvic height, scoliosis and functional outcome. <i>Bone Joint J</i> 2016; 98-B: 1145–50. 2. Castaneda P, Vidal-Ruiz C, Méndez A et al. How often does femoroacetabular impingement occur after an innominate osteotomy for acetabular dysplasia? <i>Clin Orthop Relat Res</i> 2016; 474: 1209–15. 3. Baghdadi T, Bagheri N, Khabiri SS et al. The outcome of Salter innominate osteotomy for developmental hip dysplasia before and after 3 years old. <i>Arch Bone Joint Surg</i> 2018; 6: 318–23. 31. 4. Bayhan IA, Beng K, Yildirim T et al. Comparison of Salter osteotomy and Tonniss lateral acetabuloplasty with simultaneous open reduction for the treatment of developmental dysplasia of the hip: midterm results. <i>J Pediatr Orthop Part B</i> 2016; 25: 493–8
Merckaert 2021 ⁵	OS*	1. Kubo, H, Pilge, H, Weimann-Stahlschmidt, K, et al. Use of the Tübingen splint for the initial management of severely dysplastic and unstable hips in newborns with DDH: an alternative to Fettweis plaster and Pavlik harness. <i>Arch Orthop Trauma Surg</i> 2018; 138: 149–153. 2. Baghdadi, T, Bagheri, N, Khabiri, SS, et al. The outcome of salter innominate osteotomy for developmental hip dysplasia before and after 3 years old. <i>Arch Bone Jt Surg</i> 2018; 6: 318–323. 3. Czubak, J, Kowalik, K, Kawalec, A, et al. Dega pelvic osteotomy: indications, results and complications. <i>J Child Orthop</i> 2018; 12: 342–348. 4. Baki, ME, Baki, C, Aydin, H, et al. Single-stage medial open reduction and Pemberton acetabuloplasty in developmental dysplasia of the hip. <i>J Pediatr Orthop B</i> 2016; 25: 504–508. 5. Ming-Hua, D, Rui-Jiang, X, Wen-Chao, L. The high osteotomy cut of Dega procedure for developmental dysplasia of the hip in children under 6 years of age. <i>Orthopade</i> 2016; 45: 1050–1057.

Study/year	Primary study(ies)	Reference (first author & journal)
		6. Bayhan, IA, Beng, K, Yildirim, T, et al. Comparison of Salter osteotomy and Tonnis lateral acetabuloplasty with simultaneous open reduction for the treatment of developmental dysplasia of the hip: midterm results. J Pediatr Orthop B 2016; 25: 493–498. 7. Krieg, AH, Hefti, F. [Acetabuloplasty - The Dega and Pemberton technique]. Orthopade 2016; 45: 653–658.
* = only studies published after 2015 were extracted OS = observational study; SR = systematic review.		

REFERENCES

- [1] Pavone V, de Cristo C, Vescio A, Lucenti L, Sapienza M, Sessa G, et al. Dynamic and static splinting for treatment of developmental dysplasia of the hip: a systematic review. *Children (Basel)* 2021;8(2):104.
- [2] Zhi X, Xiao X, Wan Y, Wei P, Canavese F, Xu H. Tübingen hip flexion splint for the treatment of developmental dysplasia of the hip in children younger than six months age: a meta-analysis. *J Child Orthopaed* 2021;15(4):402-8.
- [3] Ashoor M, Abdulla N, Elgabaly EA, Aldlyami E, Alshryda S. Evidence based treatment for developmental dysplasia of the hip in children under 6 months of age. Systematic review and exploratory analysis. *Surgeon* 2021;19(2):77-86.
- [4] Tejpal T, Shanmugaraj A, Gupta A, Horner NS, Simunovic N, Kishta W, et al. Outcomes and complications of patients undergoing Salter's innominate osteotomies for hip dysplasia: a systematic review of comparative studies. *J Hip Preserv Surg* 2020;7(4):621-30.
- [5] Merckaert SR, Zambelli PY, Edd SN, Daniele S, Brigitte J. Mid- and long-term outcome of Salter's, Pemberton's and Dega's osteotomy for treatment of developmental dysplasia of the hip: a systematic review and meta-analysis. *Hip Int* 2021;31(4):444-55.

APPENDIX 1: SEARCH STRATEGIES

Shared Decision Making: hip dysplasia update (KSR)

Table 3. Systematic reviews and guideline search results

Database	Dates	Results
CDSR	2019-2021/09/Iss9	0
KSR Evidence	2019-2021/09/30	19
Epistemonikos	2019-2021/09/30	30
INAHTA	2019-2021/10/5	1
NICE Evidence	2019-2021/09/30	40
NICE Guidance	2019-2021/09/30	0
GIN	2019-2021/09/30	1
ECRI	2019-2021/09/30	0
Trip	2019-2021/10/5	68
CADTH	2019-2021/10/5	0
Total		159
Total after de-duplication		118
Total after de-duplication with original ENL		117

Search strategies

Cochrane Database of Systematic Reviews (CDSR) (Wiley): 2019-2021/09/Iss9

Date searched: 30.9.21

- #1 MeSH descriptor: [Hip Dislocation, Congenital] explode all trees 92
- #2 (hip or hips) NEAR/3 (dislocat* OR dysplas* OR displace* OR sublux* OR sub-lux*):ti,ab,kw 577
- #3 (congenital* OR developmental):ti,ab,kw 15957
- #4 #2 AND #3 200
- #5 (DDH OR CDH) AND (hip or hips or femur* or acetabul*):ti,ab,kw 66
- #6 #1 OR #4 OR #5 with Cochrane Library publication date Between Jan 2019 and Oct 2021, in Cochrane Reviews, Cochrane Protocols 0

CDSR = 0

CDSR Protocols = 0

KSR Evidence (Internet): 2019-2021/09/30

<https://ksrevidence.com/>

Searched 30.9.21

- 1 hip OR hips in All text 2948 results
- 2 dislocat* OR dysplas* OR displace* OR sublux* in All text 2056 results
- 3 congenital* OR developmental in All text 3412 results
- 4 #1 and #2 and #3 in All text 37 results
- 5 CDH OR DDH in All text 56 results
- 6 #1 and #5 in All text 20 results
- 7 **#4 or #6 in All text 19 results**

Filtered by: PUBLICATION DATE 2021, 2020, 2019

Epistemonikos (Internet): 2019-2021/09/30

<https://www.epistemonikos.org/en/>

Searched 30.9.21

Limited 2019-2021.

Limited to systematic reviews, Cochrane SRs omitted.

(title:((title:((hip OR hips) AND (dislocat* OR dysplas* OR displace* OR sublux* OR sub-lux*)) OR abstract:((hip OR hips) AND (dislocat* OR dysplas* OR displace* OR sublux* OR sub-lux*)))) OR abstract:((title:((hip OR hips) AND (dislocat* OR dysplas* OR displace* OR sublux* OR sub-lux*)) OR abstract:((hip OR hips) AND (dislocat* OR dysplas* OR displace* OR sublux* OR sub-lux*)))) AND (title:((congenital* OR developmental)) OR abstract:((congenital* OR developmental)))

Retrieved 30 records.

International HTA Database (INAHTA): 2019-2021/10/05

<https://database.inahta.org/>

Searched: 5.10.21

("Hip Dislocation, Congenital"[mhe] OR (hip or hips) AND (dislocat* OR dysplas* OR displace* OR sublux* OR sub-lux*)) FROM 2019 TO 2021

Hits retrieved 1

National Institute for Health and Care Excellence (NICE): 2019-2021/09/30

<https://www.nice.org.uk/>

Searched 30.9.21

Searched for guidance under hip conditions:

0 relevant results

NICE Evidence (Internet): 2019-2021/09/30

<https://www.evidence.nhs.uk/>

Searched 30.9.21

Keyword: hip dysplasia

Guidance 23 records

Systematic Reviews 17 records

Exported 40 records to Endnote

International Guideline Library (GIN) (Internet): 2019-2021/09/30

<http://www.g-i-n.net>

Date searched: 30.9.21

Search Terms	Records Retrieved
Hip dysplasia	1
Developmental dysplasia	0/1 (dupe)

Congenital hip	0
DDH or CDH	0
Total	1

ECRI Guidelines Trust (Internet): 2019-2021/09/30

<https://guidelines.ecri.org/>

Searched 30.9.21

Searched hip dysplasia, 0 new results published after 2019

Trip Database: up to 2021/10/05

<https://www.tripdatabase.com/>

Searched: 5.10.21

Contains all words	Hits SRs	Guidelines
Hip Dysplasia	37	25
Hip Dislocation Congenital	3	6
Hip Dislocation developmental	6	7
Total	46	38
Total without duplicates	39	29

68 records retrieved

Canadian Agency for Drugs and Technologies in Health (CADTH): 2019-2021/10/05

<https://www.cadth.ca/>

Searched: 5.10.21

All words; Project Line; Health Technology Assessment; 2019-2021

Contains all words	Hits
Hip Dysplasia	0
Hip Dislocation Congenital	0
Hip Dislocation developmental	0
Developmental dysplasia	0
CDH	0
DDH	0
Total	0