SUPPLEMENTAL MATERIAL

Online supplementary appendix 1: PRISMA abstract checklist and PRISMA checklist

Table 3: PRISMA abstract checklist and PRISMA checklist

Section and Topic	Item #	Checklist item	Reported (Yes/No)
TITLE			
Title	1	Identify the report as a systematic review.	Yes
BACKGROUND			
Objectives	2	Provide an explicit statement of the main objective(s) or question(s) the review addresses.	Yes
METHODS			
Eligibility criteria	3	Specify the inclusion and exclusion criteria for the review.	Yes
Information sources	4	Specify the information sources (e.g. databases, registers) used to identify studies and the date when each was last searched.	Yes
Risk of bias	5	Specify the methods used to assess risk of bias in the included studies.	Yes
Synthesis of results	6	Specify the methods used to present and synthesise results.	Yes
RESULTS			
Included studies	7	Give the total number of included studies and participants and summarise relevant characteristics of studies.	Yes
Synthesis of results	8	Present results for main outcomes, preferably indicating the number of included studies and participants for each. If meta-analysis was done, report the summary estimate and confidence/credible interval. If comparing groups, indicate the direction of the effect (i.e. which group is favoured).	Yes
DISCUSSION			
Limitations of evidence	9	Provide a brief summary of the limitations of the evidence included in the review (e.g. study risk of bias, inconsistency and imprecision).	Yes
Interpretation	10	Provide a general interpretation of the results and important implications.	Yes
OTHER			
Funding	11	Specify the primary source of funding for the review.	Yes
Registration	12	Provide the register name and registration number.	Yes

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Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	Page 0
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	Page 2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Page 4-5
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Page 5
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Page 6-7
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	Page 5-6
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Appendix 2
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	Page 6-7
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	Page 6-7
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	Page 7
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	Page 7

Section and Topic	Item #	Checklist item	Location where item is reported
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	Page 7
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	Page 7
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	Page 7
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	Page 7
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Table 1-2
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	Not applicable
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	Not applicable
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	Not applicable
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	Appendix 3-4
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	Not applicable
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	Page 8
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	Page 8, Figure 1
Study characteristics	17	Cite each included study and present its characteristics.	Page 8-9, Table 1-2

Section and Topic	Item #	Checklist item	Location where item is reported
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Page 8, Appendix 3-4
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	Page 9-10, Table 1-2
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Table 1-2, Appendix 3-4
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	Not applicable
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	Not applicable
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	Not applicable
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	Appendix 3-4
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	Not applicable
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Page 11-12
	23b	Discuss any limitations of the evidence included in the review.	Page 12
	23c	Discuss any limitations of the review processes used.	Page 12
	23d	Discuss implications of the results for practice, policy, and future research.	Page 13
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	Page 2
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	Page 5-6
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	Not applicable

Section and Topic	Item #	Checklist item	Location where item is reported
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	Page 2
Competing interests	26	Declare any competing interests of review authors.	Page 1
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; **data extracted from included studies; data used for all analyses;** analytic code; any other materials used in the review.	Supplementary files

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Online supplementary appendix 2: Search string

a) PubMed

"Hip Dislocation, Congenital"[Mesh] OR DDH[tiab] OR CHD[tiab] OR Graf type 1[tiab] OR Graf type I[tiab] OR Graf type 2[tiab] OR Graf type II[tiab] OR Graf type 2b[tiab] OR Graf type 2c[tiab] OR Graf type IIb[tiab] OR Graf type IIc[tiab] OR ((dysplasia*[tiab] OR dyplasia*[tiab] OR dysplastic[tiab] OR dislocation*[tiab] OR displacement*[tiab]) AND ("Hip"[Mesh] OR "Hip Joint"[Mesh] OR hip[tiab] OR hips[tiab] OR coxa*[tiab])) NOT (heart disease*[tw] OR cardiolog*[tw] OR cardiovas*[tw] OR cardiac*[tw])

AND

("Equipment and Supplies"[Mesh:NoExp] OR "equipment and supplies"[tiab] OR Pavlik harness*[tiab] OR abduction device*[tiab] OR abduction brace*[tiab] OR bracing*[tiab] OR fixation*[tiab] OR splint*[tiab]) OR ("Watchful Waiting"[Mesh] OR watchful waiting[tiab] OR active surveillance[tiab] OR active monitoring[tiab] OR "wait-and-see"[tiab] OR conservative management[tiab] OR conservative treatment[tiab] OR "without treatment"[tiab] OR "no treatment"[tiab] OR "not treated"[tiab] OR observation*[tiab])

AND

"Diagnostic Imaging"[Mesh:NoExp] OR "Diagnostic imaging"[Subheading] OR (diagnostic[tiab] AND (imaging[tiab] OR image*[tiab])) OR "Ultrasonography"[Mesh] OR ultraso*[tiab] OR sonograph*[tiab] OR echograph*[tiab] OR echotomograph*[tiab] OR "Radiography"[Mesh] OR X-ray*[tiab] OR roentgen*[tiab]

AND

"Infant"[Mesh] OR child*[tiab] OR infan*[tiab] OR pediatri*[tiab] OR paediatr*[tiab] OR neonat*[tiab] OR neo-nat*[tiab] OR baby[tiab] OR babies[tiab] OR newborn*[tiab] OR new-born*[tiab] OR postneonat*[tiab] OR post-neonat*[tiab] OR postnat*[tiab] OR post-nat*[tiab] OR perinat*[tiab] OR peri-nat*[tiab]

b) Embase

Congenital hip dislocation/ OR (DDH OR CHD OR Graf type 1 OR Graf type I OR Graf type 2 OR Graf type II OR Graf type 2b OR Graf type 2c OR Graf type IIb OR Graf type IIc).ti,ab,kw. OR ((dysplasia* OR dyplasia* OR dysplastic OR dislocation* OR displacement*).ti,ab,kw. AND (hip/ OR (hip OR hips OR coxa*).ti,ab,kw.)) NOT (heart disease*.mp OR cardiolog*.mp. OR cardiovas*.mp. OR cardiac*.mp.)

AND

Devices/ OR ("equipment and supplies" OR Pavlik harness* OR abduction device* OR abduction brace* OR bracing* OR fixation* OR splint*).ti,ab,kw. OR (Watchful waiting/ OR (watchful waiting OR active surveillance OR active monitoring OR "wait-and-see" OR conservative management OR conservative treatment OR "without treatment" OR "no treatment" OR "not treated" OR observation*).ti,ab,kw.)

AND

Diagnostic imaging/ OR Diagnostic imaging equipment/ OR Diagnostic imaging.sh. OR (diagnostic.ti,ab,kw. AND (imaging OR image*).ti,ab,kw.) OR Echography/ OR radiography/ OR X-ray/ OR (echograph* OR ultraso* OR sonograph* OR echotomograph* OR X-ray* OR roentgen*).ti,ab,kw.

AND

Infant/ OR Baby/ or Newborn/ OR child/ OR (child* OR infan* OR pediatri* OR paediatr* OR neonat* OR neo-nat* OR baby OR babies OR newborn* OR new-born* OR postneonat* OR post-neonat OR postnat* OR post-nat* OR perinat* OR peri-nat*).ti,ab,kw.

c) Cochrane

((DDH OR CHD OR Graf type 1 OR Graf type I OR Graf type 2 OR Graf type II OR Graf type 2b OR Graf type 2c OR Graf type IIb OR Graf type IIc):ti,ab,kw OR ((dysplasia* OR dyplasia* OR dysplastic OR dislocation* OR displacement*):ti,ab,kw AND ((hip OR hips OR coxa*):ti,ab,kw)) NOT (heart disease* OR cardiolog* OR cardiovas* OR cardiac*):ti,ab,kw AND (("equipment and supplies" OR Pavlik harness* OR abduction device* OR abduction brace* OR bracing* OR fixation* OR splint*):ti,ab,kw OR (watchful waiting OR active surveillance OR active monitoring OR "wait-and-see" OR conservative management OR conservative treatment OR "without treatment" OR "no treatment" OR "not treated" OR observation*):ti,ab,kw) AND ((diagnostic:ti,ab,kw AND (imaging OR image*):ti,ab,kw) OR (echograph* OR ultraso* OR sonograph* OR echotomograph* OR X-ray* OR roentgen*):ti,ab,kw) AND ((child* OR infan* OR pediatri* OR paediatr* OR neonat* OR neo-nat* OR baby OR babies OR newborn* OR new-born* OR postneonat* OR post-neonat OR postnat* OR post-nat* OR perinat* OR peri-nat*):ti,ab,kw)

d) Web of Science

DDH OR CHD OR "Graf type 1" OR "Graf type I" OR "Graf type 2" OR "Graf type II" OR "Graf type 2b" OR "Graf type 2c" OR "Graf type IIb" OR "Graf type IIc" OR ((dysplasia* OR dyplasia* OR dysplastic OR dislocation* OR displacement*) AND ("Hip" OR "Hip Joint" OR hip OR hips OR coxa*)) NOT (heart disease* OR cardiolog* OR cardiovas* OR cardiac*)

AND

("equipment and supplies" OR Pavlik harness* OR abduction device* OR abduction brace* OR bracing* OR fixation* OR splint*) OR ("Watchful Waiting" OR watchful

waiting OR active surveillance OR active monitoring OR "wait-and-see" OR conservative management OR conservative treatment OR "without treatment" OR "no treatment" OR "not treated" OR observation*)

AND

(diagnostic AND (imaging OR image*)) OR "Ultrasonography" OR ultraso* OR sonograph* OR echograph* OR echotomograph* OR "Radiography" OR X-ray* OR roentgen*

AND

child* OR infan* OR pediatri* OR paediatr* OR neonat* OR neo-nat* OR baby OR babies OR newborn* OR new-born* OR postneonat* OR post-neonat* OR postnat* OR post-nat* OR perinat* OR peri-nat*

Online supplementary appendix 3: Risk of bias assessment complete

Table 4: Risk of Bias assessment with revised Cochrane risk of bias tool for randomized trials (RoB 2.0) and Cochrane tool for risk of bias in non-randomized studies (ROBINS-I)

Author/year	Study design	Risk of Bias
Wood et al., 2000	RCT	Selection bias: randomization not clearly described, baseline differences between groups, **some concerns** Performance bias: unclear if deviations from intervention occurred and if appropriate analysis was used, **some concerns** Attrition bias: some hips excluded after initial misclassification resulting in missing data, **some concerns** Detection bias: appropriate measurement methods, independent observer, **low** Reporting bias: data were analyzed according to plan, **low** Overall: **Some concerns**
Rosendahl et al., 2010	RCT	Selection bias: random allocation, no baseline differences (except for gender), **low** Performance bias: deviations from intended intervention were not balanced between groups, but were corrected for in appropriate analysis, **low** Attrition bias: data available for nearly all patients, missing data evenly distributed among both groups, **low** Detection bias: measurement methods appropriate and the same between groups, outcome assessor unaware of intervention received, **low** Reporting bias: data were analyzed according to plan, **low** Overall: **Low**
Brurås et al., 2010	RCT	Selection bias: random allocation, no baseline differences, **low** Performance bias: number deviations from intended intervention unclear, appropriate analysis used, **low** Attrition bias: data available for 65% of the patients, missing data evenly distributed among both groups, **low** Detection bias: measurement methods appropriate and the same between groups, outcome assessor unaware of intervention received, **low** Reporting bias: data were analyzed according to plan, **low** Overall: **Low**
Pollet et al., 2020	RCT	Selection bias: random allocation and comparable groups, but long inclusion duration and many patients withdrew consent, **some concerns** Performance bias: unclear if both groups received same care, appropriate analysis used, **unclear** Attrition bias: Many patients withdrew consent, but appropriate analysis used, **low** Detection bias: measuring method appropriate but at an early time, outcome assessors unaware of intervention received, **low** Reporting bias: data were analyzed according to plan, **low** Overall: **Some concerns**
Sucato et al., 1999	Retrospective cohort	Confounding bias: switches were likely to be related to outcome, but appropriate analysis used **moderate** Selection bias: in- and exclusion criteria clearly stated, start and follow-up time similar for both groups, **low** Recall bias: intervention groups clearly defined but intervention status likely to influenced by knowledge of the outcome, **serious** Performance bias: no deviations from intended interventions because of retrospective nature of the study, **low** Attrition bias: outcomes available for nearly all patients, no patients excluded because of missing data, **low** Detection bias: outcome assessors aware of intervention but methods comparable across groups and no systematic errors in measurement, **moderate** Reporting bias: reported effect not likely to be dependent on multiple measurements, analysis or subgroups, **low** Overall: **Serious**
Kim et al., 2019	Prospective cohort	Confounding bias switches were likely to be related to outcome, but appropriate analysis used, **moderate** Selection bias: in- and exclusion criteria clearly stated, start and follow-up time similar for both groups, **low** Recall bias: intervention groups clearly defined but intervention status likely to influenced by knowledge of the outcome, **serious** Performance bias: no deviations from intended intervention beyond expected in normal practice, appropriate analyses used for deviations, **low** Attrition bias: outcome data not available for all infants, but proportion was similar across groups, **low** Detection bias: outcome assessors unaware of intervention, methods comparable across groups and no systematic errors in measurement, **low** Reporting bias: reported effect not likely to be dependent on multiple measurements, analysis or subgroups, **low** Overall: **Serious**

Note: Randomized controlled trial (RCT)

Online supplementary appendix 4: Risk of bias assessment overview

Table 5: Overview of risk of bias assessment with revised Cochrane risk of bias tool for randomized trials (RoB 2.0) and Cochrane tool for risk of bias in non-randomized studies (ROBINS-I)

	Confounding bias	Selection bias	Recall bias	Performance bias	Attrition bias	Detection bias	Reporting bias	**Overall**
RCT (RoB 2.0)								
Wood, 2000	n.a.	Some concerns	n.a.	Some concerns	Some concerns	Low	Low	**Some concerns**
Rosendahl, 2010	n.a.	Low	n.a.	Low	Low	Low	Low	**Low**
Brurås, 2011	n.a.	Low	n.a.	Low	Low	Low	Low	**Low**
Pollet, 2020	n.a.	Some concerns	n.a.	Unclear	Low	Low	Low	**Some concerns**
Cohort (ROBINS-I)								
Sucato, 1999	Moderate	Low	Serious	Low	Low	Moderate	Low	**Serious**
Kim, 2019	Moderate	Low	Serious	Low	Low	Low	Low	**Serious**

Note: Randomized controlled trial (RCT), not applicable (n.a.)