Kinesiotaping for postoperative oedema – what is the evidence? A systematic review

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Abstract

Background: Postoperative oedema is a common condition affecting wound healing and function. Traditionally, manual lymphatic drainage is employed to reduce swelling. Kinesiotaping might be an alternative resource-sparing approach. This article explores current evidence for the effectiveness of kinesiotaping for the reduction of oedema in the postoperative setting.

Methods: A systematic literature search was performed on the basis of five databases (Pubmed, CINAHL, Embase, Cochrane Library, and Clinicaltrials.gov) for studies published between January 2000 and October 2019. Only prospective controlled trials were included. Case studies, uncontrolled case series, studies on oedema caused by other etiologies than by surgery, as well as studies on malignant disease related oedema (especially breast cancer related oedema) were excluded.

Articles were screened by title, abstract, and full text and the references were searched for further publications on the topic. A narrative and quantitative (using STATA) analysis was performed.

Results: One thousand two hundred sixty-three articles were screened, twelve were included in the analysis. All studies evaluated either oedema after extremity surgery or maxillofacial interventions, and showed relevant methodological flaws. Only three studies employed an active comparator. Of the twelve included studies ten found positive evidence for kinesiotape application for the reduction of swelling and beneficial effects on secondary outcome parameters such as pain and patient satisfaction. The available trials were heterogenic in pathology and all were compromised by a high risk of bias.

Conclusion: There is some evidence for the efficacy of kinesiotaping for the treatment of postoperative oedema. This evidence is, however, not yet convincing given the limitations of the published trials. Methodologically sound comparison to standard of care or an active comparator is indispensable for an evaluation of effectiveness. In addition, assessments of patient comfort and cost-benefit analyses are necessary to evaluate the potential relevance of this novel technique in daily practice.

Systematic review registration number: International prospective register of systematic reviews (PROSPERO) ID 114129.

Keywords: Kinesiotaping, Physiotape: postoperative oedema, Lymphatic drainage, Systematic review
Background
Oedema is a pathologic condition characterized by an accumulation of fluid in the interstitium, leading to local or generalized swelling. Oedemas are differentiated in primary (a systemic and often idiopathic abnormality) and secondary oedemas (an external cause leading to venous and/or lymphatic insufficiency). Secondary oedema can be caused by a variety of reasons, such as cancer, heart failure, or trauma. Surgery is also a common cause of secondary oedema [1, 2].

Traditionally, decongestive measures, including manual lymphatic drainage and compression treatment using complex multi-layer bandaging or compression stockings, as well as skin care and decongestive exercise, have been established for the treatment of oedemas [2–4].

Recently though, kinesiotaping has gained some attention in this context. The principle was developed by the Japanese chiropractor Kenzo Kase in the seventies, and has been popularized in Europe since the nineties [2, 5, 6]. A kinesiotape is an elastic tape usually made of cotton, which contains longitudinal interwoven elastic fibers and acrylic glue that is spread in a wavelike pattern. The material has an elasticity of approximately 130–140%, and is applied to the skin using a certain amount of traction, thereby influencing the skin and various subcutaneous layers [5, 7].

Many different indications for the use of kinesiotape have been proposed, such as influencing the muscular tone, supporting joint functions, affecting pain perception, and reducing swelling [5]. Regarding the treatment of oedema, several mechanisms of action are being discussed: The pre-tension of the tape subtly lifts the skin, thereby possibly improving the lymphatic flow and directing it to pathways that suffer less congestion [5]. Furthermore, the tape is assumed to provide a massage-effect during active movement [8].

Currently there are only few individual and heterogeneous trials and there is no systematic review exploring kinesiotape application for the treatment of postoperative edema independent of malignancy. The investigation reported in this article therefore aims at evaluating the current evidence to determine the state of research and the evidence for an efficacy or effectiveness of this approach following the PICOS scheme with an analysis of participants, interventions, comparisons, outcomes, and study design. This question is of relevance since superiority or even non-inferiority of kinesiotaping in the treatment of postoperative oedema might allow a change in standard management, which in turn could liberate health care professionals from resource-intensive lymphatic drainage to other important tasks like mobilization, instruction etc.

Methods
Types of studies
We conducted a systematic literature search to identify existing studies presenting original empirical research on the use of kinesiotape for the treatment of postoperative oedema following a predefined project plan (PROSPERO-114129). The actual type of index-surgery was irrelevant as in- or exclusion criterion.

Types of participants
We included prospective controlled studies published in English, German or French involving adult participants who were treated with kinesiotaping for postoperative oedema. We excluded studies analyzing the effect of kinesiotaping for oedema associated with malignancy or studies evaluating possible kinesiotape-mediated effect on muscular tonus. Equally animal studies were excluded.

Types of interventions
Kinesiotaping for the treatment of postoperative oedema was defined as wavy application of thin kinesiotape stripes converging at lymphatic drainage centres. The type of taping was identified following the authors’ descriptions or images in the publications. Studies that stated lymphaping but described or depicted other types of kinesiotape application were excluded. We included studies that compared kinesiotaping for the treatment of postoperative oedema to a) no specific or sham treatment, b) manual lymphatic drainage, or c) pneumatic compression.

Types of outcome measures
Outcomes of interest were the reduction in swelling i.e. reduction in leg circumference or facial surface, pain, function, patient satisfaction and side effects, both at specific time points or with respect to the temporal course. No primary outcome was defined a priori. The plan was to analyze all outcomes reported in the majority of studies in a comparable manner.

Search methods for identification of studies
Five databases (Pubmed, CINAHL, Embase, Cochrane Library, and Clinicaltrials.gov) were searched for published and unpublished articles. For the Cochrane Library the Cochrane Database of Systematic Reviews, the Cochrane Central Register of Controlled Trials (CENTRAL) and Cochrane Clinical Answers were searched. The search included studies that were published between January 2000 and October 2019. The exact search string for each database is reported as supporting information (S1). An overviewing search of the years 1990–1999 did not yield any publications matching the above stated inclusion criteria.
Systematic reviews on kinesiotape in general were explicitly included in the search and clearing process, in order to check for additional original articles. Also, the references of the included studies as well as the citations of these studies according to the WebOfScience were checked.

**Data collection and analysis**

**Study selection and data abstraction**

Selection and data abstraction followed van Tulder et al. [9]. Two reviewers (JH and FJS) assessed the studies for eligibility screening title and abstract. Ambiguous studies were discussed in a group of three researchers (JH, FS, and WV). For articles meeting the above described inclusion criteria, full-texts were assessed for the pre-specified aspects listed in Table 1. The PICO (population, intervention, comparison, outcome) scheme was used to extract data of interest: Population characteristics comprised inclusion criteria, the average age, the gender ratio and the type of intervention. Intervention characteristics included the method of taping, the duration of treatment and the type of additional treatments equal for both groups (see below). The control intervention included active alternative treatments like lymphatic drainage or pneumatic compression, no treatment and/or sham treatment. In all studies all patients received additional supportive treatments like anti-inflammatory medication, application of cold, physiotherapy for mobilization etc. independently from their allocation to intervention- or control-group. Outcome measures included data on the course of swelling, pain levels, function, aspects of patient satisfaction and side effects. Data were extracted and documented without a specific software.

The assessment of quality followed Higgins et al. [10] analyzing the risk of allocation bias due to randomization or allocation concealment, the risk of performance bias in the context of blinding, the risk of detection bias minimized by blinded assessment of the main outcomes, attrition bias due to incomplete outcome data and reporting bias in the context of selective reporting. The reviewers were aware of the original authors, institutions and journals for reasons of feasibility. Authors could be contacted to clarify or provide additional information if the study provided insufficient information.

**Data analysis**

For a qualitative analysis, key aspects of the studies were extracted and tabulated and the main study findings were summarized verbally. For a quantitative analysis, only the degree of swelling satisfied the predefined criteria for outcome selection. Swelling was reported as (mean) circumferences/diameters (or related measures) at time points varying substantially from study to study. Many studies reported several outcome variables related to swelling without specifying a primary outcome. We hence extracted all corresponding data from all articles, aiming at computing the difference in mean values and a confidence interval at each time point reported. For eight studies, we could extract the standard deviations and sample sizes in each arm. For the study by Windisch et al. [11], we deduced standard errors from a graphical visualization of the confidence intervals of the mean values in each arm. For the study by Białoszewski et al. [12], we made use of the $p$-values of a paired t-test comparing follow-up values with baseline values. For the study of Boguszewski et al. [13], we could not find sufficient information to compute confidence intervals. For the study by Balki et al. [14], the authors provide the mean and standard deviation values on our request.

We present the results from each study by plotting the observed difference in mean values with a 95% confidence interval at each time point. We should note that the outcomes are conceptually, but not necessarily numerically comparable. In addition, for most studies it was impossible to consider effect sizes for change scores, as the information was insufficient. Both aspects together prevent us from performing a formal meta-analysis and to assess the risk of publication bias.

**Registration**

The review was registered with PROSPERO (ID 114129).

**Results**

A total of 1263 articles were identified by our search strategy after removal of duplicates. These were screened by title, abstract, and, if potentially qualifying, by full text. We identified ten studies for analysis. Both the references within these publications and the citations of these studies allowed identifying three further studies. Finally, twelve studies were consistent with the predefined criteria. A flow diagram of the screening process...
is presented in Fig. 1. No previous systematic review considering kinesiotape as a treatment for postoperative oedema etiologically independent of malignancy could be identified.

**Qualitative analysis of included studies**

Eleven articles described prospective randomized controlled trials (RCTs), and one article described a prospective case series with a historic control. Table 2 shows a comparative overview of key aspects. A qualitative description of the included studies is presented in the supplemental material as supporting information (S2).

**Quantitative analysis**

The only quantitative outcomes that were assessed in a conceptually comparable way across the majority of studies were the extent of swelling and pain. Since the choice of pain scales and numerical reporting practice for pain varied considerably, only the degree of swelling qualified as criterion for a quantitative analysis in all twelve studies. Figure 2 presents differences in mean values between the intervention groups and the control groups for the outcome variables related to swelling from all studies.

Over all studies and all outcome variables, we observe a majority of negative differences when excluding very early assessments. This means less swelling with additional kinesiotape treatment compared to control treatment only. The only distinct exception is the study by Windisch et al. [11]. Four studies provide rather clear statistical evidence for an advantage of kinesiotaping: the study of Tozzi et al. [21] considering a single outcome, and the studies by Ristow et al. [16, 19, 20] which indicate an increasing difference over time, reaching significance at day 2 the latest. Also in the study by Donec et al. [22], we can recognize significant differences concerning three of the four outcomes at several follow-up time points, in the study of Gülenc [17] for two of four outcomes at several time points, and in the study of Balki et al. [14] for two outcomes on day 10.
| Authors                          | Research methodology | Surgical intervention | Area of application | Population/ Patients | Surgical intervention | Comparison/Control | Outcomes                        | Conclusion for reduction of edema |
|---------------------------------|----------------------|-----------------------|---------------------|----------------------|-----------------------|---------------------|------------------------|----------------------------------|
| Bialoszewski et al. [12]         | 2009                 | RCT single center     | Leg lengthening     | 24 patients 15-46 years | Leg lengthening with Ilizarov approach | Tight and kinesiotaping in addition to control treatment, picture documentation | - Manual lymphatic drainage - Isometric exercise - Non-weight-bearing activities in closed and open kinetic chains - Propriocceptive exercises - Stationary bike workout | Leg circumference 0: ➢ Significant in 5/6 locations K-Tape ➢ Significant in 3/3 locations control → favours K-Tape |
| Boguszewski et al. [13]          | 2013                 | RCT single center     | ACL reconstruction  | 26 patients 20-41 years | Knee kinesiotaping in addition to control treatment, detailed description | - Isometric exercise - Non-weight-bearing activities in closed and open kinetic chains - Propriocceptive exercises - Stationary bike workout - Isometric exercise - Non-weight-bearing activities in closed and open kinetic chains - Propriocceptive exercises - Stationary bike workout | - Pain - Swelling - ROM - Musculoskeletal pain - Perceived effect of physiotherapy | Leg circumference at knee level 0: ➢ High levels of significance at early time points K-Tape ➢ Low levels of significance at early time points control → favours K-Tape |
| Balki et al. [14]                | 2016                 | RCT single center     | ACL reconstruction  | 30 patients 18-39 years; mean age 28.1 years | Knee kinesiotaping and physiotherapy | - Sham taping - Physiotherapy | - Pain - Swelling - ROM - Musculoskeletal pain - Perceived effect of physiotherapy | Leg circumference 0: ➢ Significant difference midpatellar day 5, in 3/3 locations day 10 postop. → favours K-Tape |
| Chan et al. [15]                 | 2017                 | RCT single center     | ACL reconstruction  | 60 patients average age 26.85 years | Knee kinesiotaping in addition to control treatment, detailed description and picture documentation | - Soft tissue mobilization - Joint mobilization - Gait retraining - Therapeutic exercise - Electrical physical modalities - Stationary bike workout | - Pain score - Lysholm – Tegner Score - Mid Patellar Girth - ROM | Leg circumference at knee level 0: ➢ No significant difference at early or late time points → no favour |
| Donec et al. [16]                | 2014                 | RCT single center     | primary total knee replacement surgery | 89 patients average age 67.35 years | Knee kinesiotaping in addition to control treatment, detailed description and picture documentation | - Intermittent pneumatic compression - Physiotherapy - Occupational therapy - Massage - Laser therapy | - Pain score - Duration of postoperative wound secretion - Leg circumference at the level of the tight, knee and calf 0: ➢ Significant difference at early time points → favours K-Tape |
| Windisch et al. [11]             | 2017                 | Prospective with historical control | Total knee replacement | 42 patients age range 47-85 years | Knee kinesiotaping (detailed description and picture documentation) instead of AV Impulse System™ | - Pain - Swelling - ROM - Musculoskeletal pain - Perceived effect of physiotherapy | - Pain score - Duration of postoperative wound secretion - Leg circumference at the level of the tight, knee and calf 0: ➢ No significant difference at any time point or measuring point → no favour |
| Authors         | Research methodology | Population/ Patients | Surgical intervention | Area of application | Intervention | Comparison/Control | Outcomes | Follow up | Drop out Rate | Conclusion for reduction of edema |
|-----------------|-----------------------|----------------------|-----------------------|---------------------|--------------|--------------------|----------|-----------|---------------|----------------------------------|
| Gülenç et al.   | RCT single center     | 42 patients, older than 18 years, mean age control group: 42.25 years, mean age intervention group: 40.6 years | Knee arthroscopy | Knee | Kinesiotaping, detailed description and picture documentation | Sham taping | Pain score- Limb diameter | 6 weeks | 16% | Limb circumference at the level of the thigh and ankle: ➢ No significant difference at early or late time points Limb circumference at the kne level: ➢ Significant difference at early and late time points Limb circumference at calf level: ➢ Significant difference at late time points ➢ favours K-Tape |
| Gülenç et al.   | RCT single center     | 58 patients, 18–50 years | Shoulder arthroscopy | Shoulder | Kinesiotaping, detailed description and picture documentation | Sham taping | Pain score- Shoulder diameter | 6 weeks | 14% | Upper shoulder diameter: ➢ No significant difference at early or late time points Lower shoulder diameter: ➢ Significant difference during follow up, but not on first or last measurement ➢ favours K-Tape |
| Ristow et al.   | RCT single center     | 26 patients age range 18–75 years | ORIF of unilateral mandibular fractures | Head/Neck | Kinesiotaping in addition to control treatment, detailed description and picture documentation | - cooling - analgesia - antibiotic treatment | - Extent of max. Swelling - Extent of swelling on postoperative days 1–3 - Time of maximal swelling - Extent of detumescence | 7 days | 0% | Face surface (sum of measurement lines): ➢ Non-significant differences from max. Swelling to the day after ➢ Significant differences for increase of swelling ➢ favours K-Tape |
| Authors          | Research methodology | Population/Patients | Surgical intervention | Area of application | Intervention | Comparison/Control | Outcomes                                                                 | Follow up | Drop out Rate | Conclusion for reduction of edema |
|------------------|-----------------------|---------------------|-----------------------|---------------------|--------------|--------------------|---------------------------------------------------------------------------|-----------|----------------|----------------------------------|
| Ristow et al.    | RCT                   | single center       | 40 patients           | Removal of bilateral upper and lower wisdom teeth | Head/Neck kinesiotaping in addition to control treatment, detailed description and picture documentation | - cooling - analgesia | - Change in facial surface between day 0 and day 2 - Extent of max. Swelling - Time of maximal swelling - Extent of detumescence within 1d of max. Swelling - Pain - Mouth opening - Subjective outcomes on tape comfort - Movement limitation through tape - Subjective sensation of swelling - Patient satisfaction | 7 days    | 0%             | ➢ Significant differences from max. Swelling to the day after ➢ Significant differences for increase of swelling ➢ favours K-Tape |
| Hörmann et al.   | BMC Sports Science, Medicine and Rehabilitation (2020) 12:14 | | | | | | | | 30 patients | ORIF of zygomatico-orbital/zygomatic-maxillary fractures involving the orbital floor | Head/Neck kinesiotaping in addition to control treatment, detailed description and picture documentation | - cooling - analgesia | - Increase of swelling - Extent of maximal swelling | 7 days | 0% | Face surface (sum of measurement lines) ➢ Non-significant differences from max. Swelling to the day after |
| Authors | Research methodology | Population/ Patients | Surgical intervention | Area of application | Intervention | Comparison/Control | Outcomes | Follow up | Drop out Rate | Conclusion for reduction of edema |
|---------|----------------------|----------------------|-----------------------|---------------------|--------------|-------------------|----------|-----------|--------------|----------------------------------|
| Tozzi et al. [21] 2016 | RCT single center | 24 patients age range 18–37 years | Bimaxillary orthognathic surgery | Head/Neck | kinesiotaping in addition to control treatment, detailed description and picture documentation | perioperative steroids | - Time of maximal swelling  
- Extent of detumescence within 1d of max. Swelling  
- Pain  
- Mouth opening  
- Subjective outcomes on tape comfort  
- Movement limitation through tape  
- Subjective sensation of swelling  
- Patient satisfaction | - Change in facial surface between day 0 and day 2  
- Pain  
- Mouth opening | 4 days | 0% | ➢ Significant differences for increase of swelling  ➢ favours K-Tape |
Kinesiotaping for decongestion after crus lengthening surgery

Kinesiotaping for decongestion after reconstruction of the anterior cruciate ligament

Kinesiotaping for decongestion after total knee replacement

Kinesiotaping for decongestion after arthroscopy of knee and shoulder

Kinesiotaping for decongestion after maxillofacial surgery

Fig. 2 (See legend on next page)
Side effects
Five studies stated no adverse effects of taping; two studies reported of one (1/25 [17]), and two (2/35 [15]), patients respectively having had a skin reaction that lead to an interruption in treatment. The other studies did not comment on kinesiotape related complications.

Discussion
Summary of results
We could identify 12 studies comparing kinesiotaping for the management of postoperative oedema to other management options in a variety of patient populations. Eleven of these studies were RCTs. Estimates of the difference in swelling between the treatment groups suggested a beneficial effect of kinesiotape in many studies. However, the statistical significance of the findings in the single studies was varying and remained often unclear. It was not possible to conduct a formal meta-analysis, as the swelling was measured at different body parts and by different techniques. Furthermore, all studies were affected by a high risk of bias. Another recent trial has not yet been published but results from a conference abstract imply a significant reduction of pain and oedema after both kinesiotaping and MLD compared to control after total knee replacement [23]. The trial could not be included in the review since detailed data were not available upon request from the author.

An evaluation of the effectiveness was hampered by the fact that only three studies [11, 13, 22] involved an active comparator, two of them a pneumatic compression system and one manual lymphatic drainage. The study by Białoszewski et al. [12] as the only one comparing kinesiotaping to manual lymphatic drainage as current gold standard suffers from methodologic flaws and lacks a description of the patient population or a comparison of the two groups. Also, our quantitative analysis of this study indicates no clear treatment effect. This leaves the studies by Donec et al. [22] and Windisch et al. [11] that share a similar patient population and active comparator. Unfortunately, their conclusions are conflicting. Hence, the evidence on which to base the recommendation of kinesiotaping for the treatment of postoperative oedema is rather limited.

Risk of bias
The risk of bias is displayed in Fig. 3 as proposed by Higgins et al. [10]. Performance bias cannot be excluded, as none of the studies used an adequate sham—taping as control, hence blinding of participants and personnel was impossible. Balki et al. [14] describe sham taping with a broad strip of non-tensioned kinesiotape on the anterior and posterior distal thigh. An adequate sham-control though should visually imitate the treatment under investigation without exerting its potential effect. The studies by Gülenç et al. [17, 18] did compare kinesiotaping to a sham-taping that indeed seems to have mimicked the application technique (at least in the area of the shoulder [18], no further information has been available in the article or after contacting the author on the sham-taping around the knee), but used a tape clearly different from kinesiotape by texture and appearance [18].

All studies failed to report blinding of the assessor. Only one accurately described the random sequence generation, and none choose more reliable randomization tools than sealed envelopes. Only four studies specified a primary outcome.

Besides these threads to the internal validity of the study, the external validity was also questionable: only one study used the current standard of care (manual lymphatic drainage) as comparator, only another two used an alternative active comparator. The information on the patient population was insufficient in all studies. The comparability of the studies additionally suffered from the variation in outcome measures and in follow-up time points.

The broader context
When interpreting the results, studies from maxillofacial surgery and extremity surgery should be separated. Ristow et al. [16, 19, 20] describe a standardized postoperative regimen with non-steroidal antiphlogistic medication as analgesic medication with influence though on inflammation and swelling, as well as and application of cooling measures. Tozzi et al. [21] used the application of perioperative dexmethasone and cooling as antiphlogistic treatment. Analgesic treatment is not reported by Tozzi et al. [21], seems
probable though with potential influence on oedema development and resorption. Manual lymphatic drainage for the treatment of oedema after maxillofacial surgery does not seem as popular as in other fields of surgery. There are, however, publications that could show its benefit [24–26], and one ongoing trial is evaluating its clinical relevance [27]. Two studies – not included in this review due to the lack of control group in one and the lack of detailed information from a conference abstract in the other – state a benefit of kinesiotape application after penile surgery [28, 29], emphasizing the advantageous versatility of the technique that is adaptable to various anatomic regions. One additional study that lacked a control group and was therefore equally excluded in this review concludes a benefit of kinesiotaping after orthognathic surgery for the reduction of postoperative swelling [30].
Considering extremity surgery, manual lymphatic drainage is broadly accepted for the treatment of postoperative and posttraumatic edema [31–33] as well as edema caused by other pathologies [2, 29, 30], even though corresponding evidence is conflicting [3, 4, 34, 35]. The application of pneumatic compression was also established as treatment option [36–38], although again with limited evidence base [38–41]. Kinesiotaping might be yet another approach for the treatment of edema. Animal experiments have shown effects on the development of edema, the dermal structure [7], and lymphatic flow [8]. Indeed, the morphology of hematoma after application of kinesiotape (see Fig. 4) implies some effect. Whether this effect is of clinical relevance compared to other treatment modalities, the optimal technique, and treatment duration remains, however, unclear.

The treatment of edema remains an important aspect of postoperative therapeutic regimen, especially since edema can negatively impact function and wellbeing. In addition, edema have been found to be associated with prolonged wound healing and infections [42–44].

Given the high costs for personnel and the durability of up to 5 days of kinesiotaping, kinesiotaping is an inexpensive form of treatment compared to manual lymphatic drainage. It seems to be well accepted by most patients, and its application probably has benefits for the patient. Skin reactions are well possible, as also reported for three patients (of >200 patients in all trials treated with kinesiotape) in our investigation. In general, kinesiotaping might be considered an alternative treatment of postoperative edema which optimizes resources without jeopardizing the patients’ recovery.

**Future research**

There is an obvious need for more trials in well-defined patient-populations, covering specific indications and treatment aspects (ROM (range of motion), edema, muscle strength, pain, etc.) while minimizing the risk of bias. Active comparators should be chosen that reflect the current standard, and a primary outcome directly related to swelling (or respective pathologies) should be predefined. Swelling is well suited as primary outcome, as it is relevant for the patient due to causing discomfort or even pain and simultaneously reflects the clinical target of the intervention. All studies included in our review suggest that an effect is visible after 7 days and does not increase later, suggesting 7 days as reasonable follow-up time point. Secondary outcome variables like pain, function, and wound-healing should also be addressed systematically and not least the cost-benefit ratio. In addition, a later time point might be chosen for an assessment of the clinical outcome via patient reported outcome measures (PROMs), occurrence of complications, and return to previous activities of daily living.

**Conclusions**

In conclusion, there are many RCTs suggesting a positive effect of kinesiotape application on postoperative swelling in a variety of indications. There is today, however, a lack of solid evidence with respect to its effectiveness that could support a recommendation of this practice. Larger randomized controlled trials for each specific indication will be necessary for the generation of solid evidence. Kinesiotape could have a relevant impact on clinical practice and health care expenditure if indeed a similar efficacy compared to MLD as current standard of care could be demonstrated.

**Supplementary information**

Supplementary information accompanies this paper at https://doi.org/10.1186/s13102-020-00162-3.

**Additional file 1**. S1 File: Search strings. Search strings for the following databases: - Pubmed, - CINAHL, - Embase, - Cochrane Library, - Cochrane Database of Systematic Reviews, - Cochrane Central Register of Controlled Trials (CENTRAL), - Cochrane Clinical Answers, - Clinicaltrials.gov.

S2 File: Detailed qualitative description.
Abbreviations
CINAHL: Cumulative Index to Nursing and Allied Health Literature; ID: Identifier; MeSH: Medical Subject Headings; PICOS: Participants, interventions, comparisons, outcomes, study design; PROM: Patient Reported Outcome Measure; PROSPERO: International prospective register of systematic reviews; RCT: Randomized controlled trial; ROM: Range of motion

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Authors’ contributions
JH, WV and FS drafted the project plan and protocol, JH performed the literature search, the articles were screened and evaluated by JH and FS, WV performed the statistical analysis. MJ performed the evaluation of clinical relevance. SS supported the analysis of physiotherapeutic techniques during the screening process and acquired the clinical image. All authors were involved in the interpretation of data, the drafting of the manuscript and revisions. They all approve the submitted version and agree to be personally accountable for the author’s own

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Data and additional are available upon request to the corresponding author.

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Not applicable.

Consent for publication
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Competing interests
The authors declare that they have no competing interests.

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