Structured Abstract

# Thoracolumbar burst fracture: McCormack load-sharing classification –

1. **systematic review and single-arm meta-analysis**

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# ABSTRACT

1. **STUDY DESIGN**: A systematic review and single-arm meta-analysis of randomized
2. clinical trials.
3. **OBJECTIVE:** To evaluate if the load-sharing classification (LSC) is reliable to predict
4. the best surgical approach for thoracolumbar burst fracture (TBF).
5. **SUMMARY OF BACKGROUND DATA:** There is no previous review evaluating the
6. efficacy of the use of LSC as a guide in the surgical treatment of burst fractures.
7. **METHODS:** On April 19th, 2019, a broad search was performed in the following
8. databases: EMBASE, PubMed, Cochrane, SCOPUS, Web of Science, LILACS, and grey
9. literature. This study was registered on the International Prospective Register of
10. Systematic Reviews. We included clinical trials involving patients with TBF undergoing
11. posterior surgical treatment, classified by load-sharing score, and that enabled the
12. analysis of the outcomes loss of segmental kyphosis and implant failure. We performed
13. random or fixed effects models meta-analyses depending on the data homogeneity.
14. Heterogeneity between studies was estimated by I2 and τ2 statistics.
15. **RESULTS:** The search identified 189 references, out of which nine studies were eligible
16. for this review. All papers presenting LSC up to 6 proved to be reliable in indicating that
17. only posterior instrumentation is necessary, without screw failures or loss of kyphosis
18. correction. For cases where the LSC was higher than 6, only 2.5% of the individuals
19. presented implant failure upon posterior approach alone. For loss of kyphosis correction,
20. only 5% of patients had this outcome where LSC > 6. For both outcomes together, we
21. had 6% of postoperative problems (I2 = 77%, τ2 < 0.0015, p<0.01).
22. **CONCLUSION:** Load-sharing scores up to 6 are 100% reliable, only requiring posterior
23. instrumentation for stabilization. For scores higher than 6, the risk of implant breakage
24. and loss of kyphosis correction in posterior fixation alone is low. Thus, other factors
25. should be considered to define the best surgical approach to be adopted.

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# 31 Level of Evidence I.

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33 **Keywords:** Thoracolumbar burst fracture; Load-sharing classification.

Key Points

# Thoracolumbar burst fracture: McCormack load-sharing classification –

1. **systematic review and single-arm meta-analysis**

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# 4 KEY POINTS

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1. 1. The treatment for thoracolumbar burst fracture remains controversial and load-
2. sharing classification is one of the parameters that may help in the therapeutic
3. decision but has limitations.
4. 2. A load-sharing rating score of up to 6 is reliable to define that isolated posterior
5. instrumentation is effective in treatment.
6. 3. Burst fractures with a score above 6 in the load- sharing classification do not have
7. a high failure rate and in many cases only posterior instrumentation is effective in
8. its treatment.
9. 4. Other factors, in addition to those described by McCormack, must be considered to
10. define the best therapeutic approach when the LSC score is greater than 6 points.

Thoracolumbar burst fracture - systematic review

# Thoracolumbar burst fracture: McCormack load-sharing classification –

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# 2 systematic review and single-arm meta-analysis

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# 7 INTRODUCTION

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9 Thoracolumbar burst fracture (TBF) is defined as a fracture involving the anterior

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12 and middle spinal columns.1-5 The main characteristics of this lesion are comminution of

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14 the vertebral body, kyphotic deformity, and presence of bone fragments in the spinal

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16 canal.2-4

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19 The treatment of TBF remains quite controversial in the literature. Several

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21 approaches have been proposed, ranging from conservative to surgical treatment.1-3,6-12

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24 Even when there is a surgical indication, there are still many disputes over bone graft

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26 utilization, whether fusion is required, the number of instrumented levels, and the need to

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29 instrument the fractured vertebra or to perform vertebroplasty.1,2,7,8,13-21

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31 The evolution of spinal implants occurred over several years, but the failure rate of

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34 implants in TBF remains high.2,13,17,22-25 To prevent instrumentation failures, several

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36 surgeons have proposed various procedures and different guidelines.

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38 Several classifications to guide the treatment of TBF have emerged over the years.

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41 In 1994, McCormack and colleagues23 proposed a classification called load-sharing

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43 classification (LSC). It consists in the evaluation and scoring of three characteristic

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46 parameters of this type of fracture: comminution, intracanal fragments, and postoperative

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48 kyphosis correction. If this score is up to 6, a posterior approach alone is recommended,

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51 but if it is higher than 6, the authors recommend a second surgery by anterior approach

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53 to prevent instrumentation failure.3,11,23,26-28

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55 The objective of this systematic review of literature and single-arm meta-analysis

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58 was to evaluate if the load-sharing classification is reliable to avoid posterior

instrumentation failure. Secondarily, it aimed at evaluating if it is possible to define the

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2 best surgical approach based on LSC.

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7 **METHODS**

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9 The protocol of this study was registered on the International Prospective Register

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12 of Systematic Reviews – PROSPERO. This systematic review was conducted according

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14 to the Preferred Reporting Items for Systematic Reviews and Meta-analyses, following

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17 the PRISMA checklist ([http://www.prisma-statement.org/)29.](http://www.prisma-statement.org/)29)

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## 22 Search Strategy

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24 On April 19th, 2019, a broad search of articles without language or time limits was

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26 performed in the following databases: EMBASE, PubMed, Cochrane, SCOPUS, Web of

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29 Science, LILACS, and grey literature. Medical Subject Headings (MeSH) terms were

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31 used to develop the search strategy and to obtain the main strategy on PubMed. This

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34 strategy was adapted for the other databases (Appendix I). Manual searches in reference

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36 lists of relevant articles were also performed.

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39 Immediately after literature search, the references were exported to the on-line

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41 reference manager COVIDENCE (<https://www.covidence.org/home>).

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## 46 Inclusion and Exclusion Criteria

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48 The PICO research strategy was used to define inclusion and exclusion criteria. We

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51 defined the population as patients with TBF undergoing isolated posterior surgical

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53 treatment. The intervention is the use of load-sharing classification in TBF. Since the

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56 objective of this study is to evaluate the effectiveness of the LSC, we have no control

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58 group. The outcomes analyzed are the loss of kyphosis correction (LKC) and implant

breakage or loosening. The inclusion criterion was randomized clinical trials (RCT)

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2 involving patients with TBF submitted to posterior surgical approach where the LSC is

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4 cited and its score can be evaluated, as well as its correlation with their complications,

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7 such as LKC and implant failure (IF). We considered all types of posterior approaches

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9 (long or short instrumentation, with or without graft, with or without vertebroplasty, with

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12 or without fusion, and using screw in the fractured vertebra or not). The LKC and IF were

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14 the primary outcomes considered. As mentioned by Alanay24,25 and Wei20, we considered

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17 a loss of 10° Cobb during follow-up as LKC.

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19 Exclusion criteria comprised any article other than RCT, studies that do not mention

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21 LSC or cannot correlate it with outcomes, fractures elsewhere or not classified as burst

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24 fractures, osteoporotic fractures, or any other treatment that is not performed surgically

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26 with posterior fixation.

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## 31 Data Extraction

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34 The articles selection was performed in two phases. In phase one, two independent

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36 reviewers (EGF and HECS) evaluated titles and abstracts of all articles. In phase two, the

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39 same reviewers independently read the full texts. In case of disagreements, a third

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41 reviewer (AMIO) analyzed the articles to come to a final decision.

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## 46 Tabulation of Findings

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48 Data extraction was also performed by two independent reviewers, being

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51 subsequently compared. Extracted data comprised author, year, country, journal, sample,

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53 age; LSC score; groups, treatments, and follow-up; fracture site and trauma mechanism;

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56 outcome of LKC/IF, n (%) and P value; main conclusions; and risk of bias assessments.

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## Risk of Bias Assessment

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2 The risk of bias of the studies was assessed through the Cochrane Collaboration’s

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4 tool for assessing risk of bias in randomized trials30. Two review authors (EGF and

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7 HECS) independently assessed the risk of bias of the included studies. The following

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9 domains were assessed: random sequence generation; allocation concealment; blinding

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12 of participants and personnel; blinding of outcome assessment; completeness of outcome

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14 data; and selective reporting and other bias. Disagreements were resolved by consulting

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17 a third review author (AMIO).

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## 22 Considered Outcomes

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24 The intervention effects were compared for the following outcomes: failure of the

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26 implant and LKC and their correlation with the load-sharing classification.

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## 31 Statistical Analysis

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34 Patients who had up to 6 points in the LSC presented 100% good results after the

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36 posterior approach and, therefore, no meta-analysis was performed.

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## 41 Meta-Analysis

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43 For patients with LSC higher than 6, a meta-analysis was calculated for each of the

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46 available outcomes (implant failure and LKC) individually and for all outcomes together,

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48 at a 95% significance level. The heterogeneity and weight of the studies were calculated.

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51 It was not possible to perform classic meta-analysis due to lack of a control group. Single-

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53 arm meta-analyses were performed by R program31. For comparison purposes, we

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56 adopted a confidence interval estimation using the method of simple approximation

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58 interval with continuity correction – SACC. In each analysis, the p-value was obtained.

The fixed or random effects models was used depending on the homogeneity of the

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2 sample. The heterogeneity of the sample was calculated using the Cochran Q test. Where

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4 heterogeneity was confirmed, the inconsistency measure (I2) was used for its

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7 quantification. Values between 25% and 50% represent a low heterogeneity, between

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9 50% and 75%, moderate heterogeneity, and above 75%, high heterogeneity. For random

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12 effects meta-analyses, T2 was also used to measure the degree of heterogeneity.

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17 **RESULTS**

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## 19 Search Findings

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21 The search in five databases resulted in 189 references. The removal of duplicated

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24 studies resulted in 72 references. Titles and abstracts from these studies were read and

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26 those not fulfilling the eligibility criteria were excluded. Additionally, grey literature was

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29 searched. JSTOR and Open Grey returned 0 references. From Google Scholar, the first

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31 60 references were considered for evaluation. At the end of phase one, 17 studies

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34 remained for full text reading (phase two). Full text reading resulted in nine studies

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36 eligible for qualitative analysis (Figure 1).

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## 41 Risk of Bias within Studies

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43 None of the studies fulfilled all methodological quality criteria. One study was

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46 considered at low risk of bias2, while six of them were considered at high risk of bias.1,18-

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48 20,24,25 The risk of bias of the other two was considered moderate17,32.

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51 Six studies did not describe the randomization process properly, nor the allocation

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53 concealment1,18-20,24,25. One study detailed the method of randomization, as well as the

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56 allocation2. The other two studies described the method of randomization, but did not

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58 describe the allocation17,32.

No study described the blinding of participants and personnel as determined by the

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2 risk of bias instrument30 used and, even when only the blinding of outcome evaluators

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4 was considered, it was mentioned in two studies2,17 (Figure 2).

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## 9 Synthesis of Results

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12 The nine studies included contemplated 456 patients. All patients were operated by

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14 posterior approach only. According to the load-sharing classification, patients were

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17 divided into two groups: one group was composed of patients with LSC score up to 6,

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19 case in which, as per McCormack’s original description23, only posterior instrumentation

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21 is required; and the other group was composed of those with scores higher than 6, case in

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24 which the associated anterior approach would be required.

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26 Four studies, totaling 172 patients, analyzed only LSC scores up to 62,17,18,32. In

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29 none of the cases there was a LKC greater than 10° in the follow-up or IF (0% of failure).

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31 Six studies analyzed 284 patients with LSC higher than 61,17,19,20,24,25. In such group, we

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34 had seven breaks or loosening of screws and 14 cases of loss of kyphosis greater than 10°.

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36 Four screws breakages were associated with LKC. Thus, we had 17 patients with

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39 complications (5.98% of failure in primary outcomes). Evaluating only papers presenting

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41 LSC higher or equal to 71,19,24,25, we had 116 patients and 13 failures, totaling a rate of

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43 complications of 11.2%.

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46 Individual results are listed in Table 1.

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## 51 Statistical Analysis

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53 From the total sample, we had 172 patients with LSC up to 6. None of these cases

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56 had the outcomes surveyed (LKC or IF), therefore, 100% of these patients had a good

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58 response to the posterior surgical approach.

## Meta-Analysis

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2 In the group of patients with LSC higher than 6, it was possible to perform a single-

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4 arm meta-analysis. For a better understanding, we individualized the outcomes. A forest

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7 plot was created for IF (break or loosening), another plot was created for the outcome

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9 LKC, and a third plot was created for these two outcomes together.

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12 The first outcome studied was implant failure. For six papers involving a total of

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14 284 patients with LSC higher than 6 included in this review, there were seven failures,

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17 representing a failure rate of 2.5%. Three tests were used to verify the homogeneity of

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19 the data. The p-value 0.373, inconsistency measure I2 6.8%, and T2 near zero showed that

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21 the sample at issue was homogeneous. We used the fixed effects model (Figure 3).

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24 Another outcome used in the study, LKC, was analyzed in Figure 4. Out of a total

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26 of 284 patients, this result was found in 14 cases when LSC > 6, i.e., there was only 5%

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29 of loss of kyphosis greater than 10°. In this forest plot, the same tests confirmed the

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31 heterogeneity of the data.

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34 For both outcomes together, we had 17 cases that did not present a good progress

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36 regarding LKC or implant failure (6% of bad results). Figure 5 shows the data with high

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39 heterogeneity due to the Alanay B paper discrepancy.

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43 **DISCUSSION**

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46 The first attempts to standardize the TBF classification date from 1929, when

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48 Böehler introduced a classification based on trauma mechanism and fracture geometry3,33.

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51 In the following decade, Watson-Jones introduced the concept of stability, emphasizing

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53 the posterior ligament complex3. Later, in 1949, Nicoll addressed four structures that must

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56 be considered to classify injuries: vertebral body, disc, facet joint, and posterior ligament

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58 complex3,33.

It was only in 1970 that Sir Frank introduced the concept of two columns,

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2 describing the burst fracture for the first time3. In 1983, Francis Denis popularized the

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4 concept of middle column by dividing it into three columns, a concept widely used

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7 today1,3,17,21,24,25,33,34. Several other classifications have emerged since then. McCormack,

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9 in 1994, noted that some cases of burst fracture surgically treated with short-segment

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12 fixation did not present a good outcome and created a new classification called load-

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14 sharing classification23.

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17 Biomechanical studies show that the load distribution on the spine corresponds to

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19 80% to 90% on the vertebral body and the remaining portion on the posterior elements,

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21 hence the substantial importance of Denis’ anterior and middle column in spine

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24 stabilization21,35. According to studies carried out by Rohlmann35 and Wang11, even after

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26 the stabilization of the spine with a pedicle screw system, the load-sharing remains high

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29 on the anterior and middle columns, with a low load being transferred to the implant and

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31 to the posterior column. This may contribute to IF and poor surgical outcomes.

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34 Though McCormack’s classification also received some criticism, such as not

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36 considering the neurologic status and the integrity of the posterior ligament

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38 complex13,21,23,28, taking our findings into account, the load-sharing theory proved to be a

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41 parameter to guide the treatment of TBF.2-5,11,13,21,22

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43 After an extensive review of the literature, we did not find any article that studies

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46 the efficacy of LSC as a guide for TBF treatment. After the whole selection previously

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48 described, we selected nine RCT on the subject. As there is no specific paper to evaluate

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51 outcomes, these articles varied greatly in relation to the surgical technique adopted. Both

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53 studies carried out by Alanay compared the use or not of transpedicular bone graft to

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56 evaluate canal remodeling and postop complications24,25. Aono's study compared

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58 vertebroplasty with non-vertebroplasty1. Dai carried out a comparative study between

fusion and non-fusion2. Guven studied the number of levels included in the fixation and

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2 the screw presence in the fractured vertebra17. Jiang compared surgical accesses for TBF

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4 fixation32. Korovessis compared the anterior access approach with the posterior one (for

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7 the purpose of this study, we only analyzed the posterior approach)18. Sun compared the

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9 unilateral fractured vertebra fixation with the bilateral procedure19, while Wei compared

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12 the monosegmental fixation with the short fixation20. Although all randomized studies

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14 employed different techniques, we extracted the LSC from each group and compared it

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17 to the results obtained.

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19 By analyzing the groups of articles that had LSC scores between 3 and 6, we

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21 obtained four studies, totaling 172 patients2,17,18,32. It was possible to note that no patient

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24 presented significant LKC or IF. This result shows us that the classification at issue is

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26 very useful and 100% correct in stating that posterior fixation is sufficient and effective

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29 to prevent the complications studied in the treatment of TBF.

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31 By only studying the groups with LSC scores higher than 6, totaling 284

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34 patients1,17,19,20,24,25, the effectiveness of the classification is however questionable. In this

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36 subgroup, a high rate of postoperative complications would be expected according to the

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39 original description, but there were only seven breaks or loosening of screws and 14 cases

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41 of significant LKC, while four patients experienced both events simultaneously. Thus,

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43 only about 6% (17) patients presented the postoperative complications studied. It leads

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46 us to believe that there are other factors that must be taken into consideration when

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48 defining which treatment to adopt in TBF cases and that LSC alone is not reliable to

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51 define the treatment when its value is higher than 6.

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53 As in McCormack's original classification23, the score is given in integers and not

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56 decimal numbers, and this factor may contribute to the low rate of poor outcomes in the

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58 LSC subgroup > 6. We further analyzed patients who had LSC scores higher than or equal

to 7 separately and, even so, the incidence of the studied failures was low. There were

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2 116 patients classified with score 7 or more and 13 failures, which corresponds to a failure

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4 rate of 11%1,19,24,25. We would have to look for other variables that may be affecting the

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7 emergence of these failures.

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9 By analyzing the meta-analyses performed in the LSC > 6 subgroup, we studied

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12 only the screw breakages or looseness, identifying a very homogeneous sample with a

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14 2.5% failure rate. In the other hand, by analyzing the LKC, we noticed a heterogeneous

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17 sample, in large part due to the discrepancy of the results of Alanay B study24, showing

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19 5% of bad result. Such heterogeneity was also present by studying both variables together,

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21 for the same reason mentioned above. Such study was specifically aimed at evaluating

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24 the short instrumentation failure rate with or without transpedicular graft and showed

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26 more than 40% of failure, mainly characterized by LKC. We have no description

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29 (regarding LSC) as to which patients presented the failures, but the average loss of

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31 correction in both groups ranges from 5° to 6°, which leads us to believe that another

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34 factor may have contributed to this high rate of failure – a factor that was not described

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36 by McCormack.

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38 McCormack, Gaines, and collaborators23 contributed greatly to the study of TBF,

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41 however, the proposed load-sharing classification is not reliable to define the best

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43 treatment to be performed when the score is higher than 6. Other factors such as

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46 neurological status, integrity of ligament complex, trauma mechanism, and time of injury

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48 should be better studied as, in association with the criteria described by McCormack, they

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51 may help to define the best approach to be adopted.13,21,23,28,33

# CONCLUSION

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2 In summary, the systematic literature review shows that load-sharing scores up to

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4 6 are 100% reliable and that posterior instrumentation alone is sufficient for stabilization.

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7 Regarding values above 6, the meta-analysis concludes that the risk of implant breakage

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9 and loss of kyphosis correction in isolated posterior fixation is low. Thus, other factors

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12 should be considered to define the best surgical approach.

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Appendix 1

**Appendix 1 –** Database search strategy

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| --- | --- | --- |
| **Database** | **Search (18th April , 2019)** | **References** |
| **PubMed** | **#1 –** ("lumbar spine"[All Fields] OR "Lumbar vertebrae"[All Fields] OR ("lumbar vertebrae"[MeSH Terms] OR ("lumbar"[All Fields] AND "vertebrae"[All Fields]) OR "lumbar vertebrae"[All Fields] OR ("vertebrae"[All Fields] AND "lumbar"[All Fields])) OR "thoracic vertebrae"[All Fields] OR ("thoracic vertebrae"[MeSH Terms] OR ("thoracic"[All Fields] AND "vertebrae"[All Fields]) OR "thoracic vertebrae"[All Fields] OR ("vertebrae"[All Fields] AND "thoracic"[All Fields]))) AND ("Fractures, Bone"[All Fields] OR "Broken Bones"[All Fields] OR ("fractures, bone"[MeSH Terms] OR ("fractures"[All Fields] AND "bone"[All Fields]) OR "bone fractures"[All Fields] OR ("bone"[All Fields] AND "broken"[All Fields])) OR ("fractures, bone"[MeSH Terms] OR ("fractures"[All Fields] AND "bone"[All Fields]) OR "bone fractures"[All Fields] OR ("bones"[All Fields] AND "broken"[All Fields])) OR "Broken Bone"[All Fields] OR "Bone Fractures"[All Fields] OR "Bone Fracture"[All Fields] OR "Fracture, Bone"[All Fields] OR "Spiral Fractures"[All Fields] OR ("fractures, bone"[MeSH Terms] OR ("fractures"[All Fields] AND "bone"[All Fields]) OR "bone fractures"[All Fields] OR ("fracture"[All Fields] AND "spiral"[All Fields])) OR ("fractures, bone"[MeSH Terms] OR ("fractures"[All Fields] AND "bone"[All Fields]) OR "bone fractures"[All Fields] OR ("fractures"[All Fields] AND "spiral"[All Fields])) OR "Spiral Fracture"[All Fields] OR "Torsion Fractures"[All Fields] OR ("fractures, bone"[MeSH Terms] OR ("fractures"[All Fields] AND "bone"[All Fields]) OR "bone fractures"[All Fields] OR ("fracture"[All Fields] AND "torsion"[All Fields])) OR ("fractures, bone"[MeSH Terms] OR ("fractures"[All Fields] AND "bone"[All Fields]) OR "bone fractures"[All Fields] OR ("fractures"[All Fields] AND "torsion"[All Fields])) OR "Torsion Fracture"[All Fields] OR "Spinal Fractures"[All Fields] OR "Fracture, Spinal"[All Fields] OR "Fractures, Spinal"[All Fields] OR "Spinal Fracture"[All Fields] OR ("orthopedics"[MeSH Terms] OR "orthopedics"[All Fields]) OR ("orthopaedic"[All Fields] OR "orthopedics"[MeSH Terms] OR "orthopedics"[All Fields] OR "orthopedic"[All Fields]) OR "Orthopedic Surgery"[All Fields] OR "Orthopedic Surgeries"[All Fields] OR ("orthopedics"[MeSH Terms] OR "orthopedics"[All Fields] OR ("surgeries"[All Fields] AND "orthopedic"[All Fields])) OR "Surgery, Orthopedic"[All Fields] OR "thoracolumbar burst fracture"[All Fields] OR "spinal burst fracture"[All Fields] OR (burst[All Fields] AND ("fractures, bone"[MeSH Terms] OR ("fractures"[All Fields] AND "bone"[All Fields]) OR "bone fractures"[All Fields] OR "fracture"[All Fields]) AND thoracolumbar[All Fields] AND ("spine"[MeSH Terms] OR "spine"[All Fields]))) AND ("Vertebroplasty"[All Fields] OR "Fracture Reduction"[All Fields] OR "Fracture Reductions"[All Fields] OR ("fracture fixation"[MeSH Terms] OR ("fracture"[All Fields] AND "fixation"[All Fields]) OR "fracture fixation"[All Fields] OR ("reduction"[All Fields] AND "fracture"[All Fields])) OR ("fracture fixation"[MeSH Terms] OR ("fracture"[All Fields] AND "fixation"[All Fields]) OR "fracture fixation"[All Fields] OR ("reductions"[All Fields] AND "fracture"[All Fields])) OR "Fracture Fixation, Internal"[All Fields] OR ("fracture fixation"[MeSH Terms] OR ("fracture"[All Fields] AND "fixation"[All Fields]) OR "fracture fixation"[All Fields] OR  ("fixation"[All Fields] AND "fracture"[All Fields])) OR ("fracture | **74** |

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|  | fixation"[MeSH Terms] OR ("fracture"[All Fields] AND "fixation"[All Fields]) OR "fracture fixation"[All Fields] OR ("fixations"[All Fields] AND "fracture"[All Fields])) OR "Fracture Fixations"[All Fields] OR "Skeletal Fixation"[All Fields] OR ("fracture fixation"[MeSH Terms] OR ("fracture"[All Fields] AND "fixation"[All Fields]) OR "fracture fixation"[All Fields] OR ("fixation"[All Fields] AND "skeletal"[All Fields])) OR ("fracture fixation"[MeSH Terms] OR ("fracture"[All Fields] AND "fixation"[All Fields]) OR "fracture fixation"[All Fields] OR ("fixations"[All Fields] AND "skeletal"[All Fields])) OR "Skeletal Fixations"[All Fields] OR "short-segment fixation"[All Fields] OR "long- segment fixation"[All Fields] OR "posterior short-segment fixation"[All Fields] OR "short segment pedicle screw fixation"[All Fields] OR "Pedicle Screws"[All Fields] OR "Pedicle screw fixation"[All Fields] OR "posterior stabilization"[All Fields] OR "Posterior approach"[All Fields] OR "Posterior short-segment fixation"[All Fields] OR ("transplantation"[Subheading] OR "transplantation"[All Fields] OR "grafting"[All Fields] OR "transplantation"[MeSH Terms] OR "grafting"[All Fields]) OR spread[All Fields] OR "monosegmental transpedicular fixation"[All Fields] OR "Vertebral augmentation"[All Fields])  **#2** - "load-sharing classification"[All Fields] OR "load sharing classification"[All Fields] OR "load sharing"[All Fields] OR "load-sharing"[All Fields] OR "load sharing score"[All Fields] OR "load-sharing score"[All Fields] OR (McCormack[All Fields] AND score[All Fields]) OR (McCormack[All Fields] AND ("classification"[Subheading] OR "classification"[All Fields] OR "classification"[MeSH Terms])) OR (McCormack[All Fields] AND load-sharing[All Fields] AND ("classification"[Subheading] OR "classification"[All Fields] OR "classification"[MeSH Terms]))  **#3 -** (#1 AND #2) |  |
| **Cochrane** | **("lumbar spine" OR "Lumbar vertebrae" OR "Vertebrae, lumbar" OR "thoracic vertebrae" OR "vertebrae, thoracic") AND ("Fractures, Bone" OR "Broken Bones" OR "Bone, Broken" OR "Bones, Broken" OR "Broken Bone" OR "Bone Fractures" OR "Bone Fracture" OR "Fracture, Bone" OR "Spiral Fractures" OR "Fracture, Spiral" OR "Fractures, Spiral" OR "Spiral Fracture" OR "Torsion Fractures" OR "Fracture, Torsion" OR "Fractures, Torsion" OR "Torsion Fracture" OR "Spinal Fractures" OR "Fracture, Spinal" OR "Fractures, Spinal" OR "Spinal Fracture" OR Orthopedics OR Orthopedic OR "Orthopedic Surgery" OR "Orthopedic Surgeries" OR "Surgeries, Orthopedic" OR "Surgery, Orthopedic" OR "thoracolumbar burst fracture" OR "spinal burst fracture" OR "burst fracture of the thoracolumbar spine") AND (Vertebroplasty OR "Fracture Reduction" OR "Fracture Reductions" OR "Reduction, Fracture" OR "Reductions, Fracture" OR "Fracture Fixation, Internal" OR "Fixation, Fracture" OR "Fixations, Fracture" OR "Fracture Fixations" OR "Skeletal Fixation" OR "Fixation, Skeletal" OR "Fixations, Skeletal" OR "Skeletal Fixations" OR "short-segment fixation" OR "long-segment fixation" OR "posterior short-segment fixation" OR "short segment pedicle screw fixation" OR "Pedicle Screws" OR "Pedicle screw fixation" OR "posterior stabilization" OR "Posterior approach" OR "Posterior short-segment fixation" OR grafting OR spread OR "monosegmental transpedicular fixation" OR "Vertebral augmentation") in Title Abstract Keyword AND "load- sharing classification" OR "load sharing classification" OR "load**  **sharing" OR "load-sharing" OR "load sharing score" OR "load-sharing** | **05** |

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|  | **score" OR "McCormack score" OR "McCormack classification" OR "McCormack load-sharing classification" in Title Abstract Keyword - (Word variations have been searched)** |  |
| **Scopus** | [( TITLE-ABS-KEY ( "lumbar spine" OR "Lumbar](https://www-scopus.ez68.periodicos.capes.gov.br/results/documentSpellSuggest.uri?sort=plf-f&src=s&st1=%22lumbar%2Bspine%22%2BOR%2B%22Lumbar%2Bvertebrae%22%2BOR%2B%22Vertebrae%2c%2Blumbar%22%2BOR%2B%22thoracic%2Bvertebrae%22%2BOR%2B%22vertebrae%2c%2Bthoracic%22&st2=%22Bone%2BFracture%22%2BOR%2B%22Spiral%2BFracture%22%2BOR%2B%22Torsion%2BFractures%22%2BOR%2B%22Torsion%2BFracture%22%2BOR%2B%22Spinal%2BFractures%22%2BOR%2B%22Spinal%2BFracture%22%2BOR%2B%22thoracolumbar%2Bburst%2Bfracture%22%2BOR%2B%22spinal%2Bburst%2Bfracture%22%2BOR%2B%22burst%2Bfracture%2Bof%2Bthe%2Bthoracolumbar%2Bspine%22&searchTerms=Vertebroplasty%2BOR%2B%22Fracture%2BFixation%2cInternal%22%2BOR%2B%22Fracture%2BFixations%22%2BOR%2B%22Skeletal%2BFixation%22%2BOR%2B%22short-segment%2Bfixation%22%2BOR%2B%22long-segment%2Bfixation%22%2BOR%2B%22posterior%2Bshort-segment%2Bfixation%22%2BOR%2B%22Pedicle%2Bscrew%2Bfixation%22%2BOR%2B%22Posterior%2Bshort-segment%2Bfixation%22%3f%21%22%2A%24%22load-sharing%2Bclassification%22%2BOR%2B%22load%2Bsharing%2Bclassification%22%2BOR%2B%22load%2Bsharing%22%2BOR%2B%22load-sharing%22%2BOR%2B%22load%2Bsharing%2Bscore%22%2BOR%2B%22load-sharing%2Bscore%22%2BOR%2B%22McCormack%2Bscore%22%2BOR%2B%22McCormack%2Bclassification%22%2BOR%2B%22McCormack%2Bload-sharing%2Bclassification%22%3f%21%22%2A%24&sid=25283f5151ffadb82b00c9e00ba7016e&sot=b&sdt=b&sl=923&s=%28%2BTITLE-ABS-KEY%2B%28%2B%22lumbar%2Bspine%22%2BOR%2B%22Lumbar%2Bvertebrae%22%2BOR%2B%22Vertebrae%2c%2Blumbar%22%2BOR%2B%22thoracic%2Bvertebrae%22%2BOR%2B%22vertebrae%2c%2Bthoracic%22%2B%29%2BAND%2BTITLE-ABS-KEY%2B%28%2B%22Bone%2BFracture%22%2BOR%2B%22Spiral%2BFracture%22%2BOR%2B%22Torsion%2BFractures%22%2BOR%2B%22Torsion%2BFracture%22%2BOR%2B%22Spinal%2BFractures%22%2BOR%2B%22Spinal%2BFracture%22%2BOR%2B%22thoracolumbar%2Bburst%2Bfracture%22%2BOR%2B%22spinal%2Bburst%2Bfracture%22%2BOR%2B%22burst%2Bfracture%2Boff%2Bthe%2Bthoracolumbar%2Bspine%22%2B%29%2BAND%2BTITLE-ABS-KEY%2B%28%2Benteroplasty%2BOR%2B%22Fracture%2BFixation%2c%2BInternal%22%2BOR%2B%22Fracture%2BFixations%22%2BOR%2B%22Skeletal%2BFixation%22)  [vertebrae" OR "Vertebrae, lumbar" OR "thoracic](https://www-scopus.ez68.periodicos.capes.gov.br/results/documentSpellSuggest.uri?sort=plf-f&src=s&st1=%22lumbar%2Bspine%22%2BOR%2B%22Lumbar%2Bvertebrae%22%2BOR%2B%22Vertebrae%2c%2Blumbar%22%2BOR%2B%22thoracic%2Bvertebrae%22%2BOR%2B%22vertebrae%2c%2Bthoracic%22&st2=%22Bone%2BFracture%22%2BOR%2B%22Spiral%2BFracture%22%2BOR%2B%22Torsion%2BFractures%22%2BOR%2B%22Torsion%2BFracture%22%2BOR%2B%22Spinal%2BFractures%22%2BOR%2B%22Spinal%2BFracture%22%2BOR%2B%22thoracolumbar%2Bburst%2Bfracture%22%2BOR%2B%22spinal%2Bburst%2Bfracture%22%2BOR%2B%22burst%2Bfracture%2Bof%2Bthe%2Bthoracolumbar%2Bspine%22&searchTerms=Vertebroplasty%2BOR%2B%22Fracture%2BFixation%2cInternal%22%2BOR%2B%22Fracture%2BFixations%22%2BOR%2B%22Skeletal%2BFixation%22%2BOR%2B%22short-segment%2Bfixation%22%2BOR%2B%22long-segment%2Bfixation%22%2BOR%2B%22posterior%2Bshort-segment%2Bfixation%22%2BOR%2B%22Pedicle%2Bscrew%2Bfixation%22%2BOR%2B%22Posterior%2Bshort-segment%2Bfixation%22%3f%21%22%2A%24%22load-sharing%2Bclassification%22%2BOR%2B%22load%2Bsharing%2Bclassification%22%2BOR%2B%22load%2Bsharing%22%2BOR%2B%22load-sharing%22%2BOR%2B%22load%2Bsharing%2Bscore%22%2BOR%2B%22load-sharing%2Bscore%22%2BOR%2B%22McCormack%2Bscore%22%2BOR%2B%22McCormack%2Bclassification%22%2BOR%2B%22McCormack%2Bload-sharing%2Bclassification%22%3f%21%22%2A%24&sid=25283f5151ffadb82b00c9e00ba7016e&sot=b&sdt=b&sl=923&s=%28%2BTITLE-ABS-KEY%2B%28%2B%22lumbar%2Bspine%22%2BOR%2B%22Lumbar%2Bvertebrae%22%2BOR%2B%22Vertebrae%2c%2Blumbar%22%2BOR%2B%22thoracic%2Bvertebrae%22%2BOR%2B%22vertebrae%2c%2Bthoracic%22%2B%29%2BAND%2BTITLE-ABS-KEY%2B%28%2B%22Bone%2BFracture%22%2BOR%2B%22Spiral%2BFracture%22%2BOR%2B%22Torsion%2BFractures%22%2BOR%2B%22Torsion%2BFracture%22%2BOR%2B%22Spinal%2BFractures%22%2BOR%2B%22Spinal%2BFracture%22%2BOR%2B%22thoracolumbar%2Bburst%2Bfracture%22%2BOR%2B%22spinal%2Bburst%2Bfracture%22%2BOR%2B%22burst%2Bfracture%2Boff%2Bthe%2Bthoracolumbar%2Bspine%22%2B%29%2BAND%2BTITLE-ABS-KEY%2B%28%2Benteroplasty%2BOR%2B%22Fracture%2BFixation%2c%2BInternal%22%2BOR%2B%22Fracture%2BFixations%22%2BOR%2B%22Skeletal%2BFixation%22) [vertebrae" OR "vertebrae, thoracic" ) AND TITLE-ABS-KEY ( 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[Fracture" OR "Spiral Fracture" OR "Torsion Fractures" OR "Torsion](https://www-scopus.ez68.periodicos.capes.gov.br/results/documentSpellSuggest.uri?sort=plf-f&src=s&st1=%22lumbar%2Bspine%22%2BOR%2B%22Lumbar%2Bvertebrae%22%2BOR%2B%22Vertebrae%2c%2Blumbar%22%2BOR%2B%22thoracic%2Bvertebrae%22%2BOR%2B%22vertebrae%2c%2Bthoracic%22&st2=%22Bone%2BFracture%22%2BOR%2B%22Spiral%2BFracture%22%2BOR%2B%22Torsion%2BFractures%22%2BOR%2B%22Torsion%2BFracture%22%2BOR%2B%22Spinal%2BFractures%22%2BOR%2B%22Spinal%2BFracture%22%2BOR%2B%22thoracolumbar%2Bburst%2Bfracture%22%2BOR%2B%22spinal%2Bburst%2Bfracture%22%2BOR%2B%22burst%2Bfracture%2Bof%2Bthe%2Bthoracolumbar%2Bspine%22&searchTerms=Vertebroplasty%2BOR%2B%22Fracture%2BFixation%2cInternal%22%2BOR%2B%22Fracture%2BFixations%22%2BOR%2B%22Skeletal%2BFixation%22%2BOR%2B%22short-segment%2Bfixation%22%2BOR%2B%22long-segment%2Bfixation%22%2BOR%2B%22posterior%2Bshort-segment%2Bfixation%22%2BOR%2B%22Pedicle%2Bscrew%2Bfixation%22%2BOR%2B%22Posterior%2Bshort-segment%2Bfixation%22%3f%21%22%2A%24%22load-sharing%2Bclassification%22%2BOR%2B%22load%2Bsharing%2Bclassification%22%2BOR%2B%22load%2Bsharing%22%2BOR%2B%22load-sharing%22%2BOR%2B%22load%2Bsharing%2Bscore%22%2BOR%2B%22load-sharing%2Bscore%22%2BOR%2B%22McCormack%2Bscore%22%2BOR%2B%22McCormack%2Bclassification%22%2BOR%2B%22McCormack%2Bload-sharing%2Bclassification%22%3f%21%22%2A%24&sid=25283f5151ffadb82b00c9e00ba7016e&sot=b&sdt=b&sl=923&s=%28%2BTITLE-ABS-KEY%2B%28%2B%22lumbar%2Bspine%22%2BOR%2B%22Lumbar%2Bvertebrae%22%2BOR%2B%22Vertebrae%2c%2Blumbar%22%2BOR%2B%22thoracic%2Bvertebrae%22%2BOR%2B%22vertebrae%2c%2Bthoracic%22%2B%29%2BAND%2BTITLE-ABS-KEY%2B%28%2B%22Bone%2BFracture%22%2BOR%2B%22Spiral%2BFracture%22%2BOR%2B%22Torsion%2BFractures%22%2BOR%2B%22Torsion%2BFracture%22%2BOR%2B%22Spinal%2BFractures%22%2BOR%2B%22Spinal%2BFracture%22%2BOR%2B%22thoracolumbar%2Bburst%2Bfracture%22%2BOR%2B%22spinal%2Bburst%2Bfracture%22%2BOR%2B%22burst%2Bfracture%2Boff%2Bthe%2Bthoracolumbar%2Bspine%22%2B%29%2BAND%2BTITLE-ABS-KEY%2B%28%2Benteroplasty%2BOR%2B%22Fracture%2BFixation%2c%2BInternal%22%2BOR%2B%22Fracture%2BFixations%22%2BOR%2B%22Skeletal%2BFixation%22) [Fracture" OR "Spinal Fractures" OR "Spinal](https://www-scopus.ez68.periodicos.capes.gov.br/results/documentSpellSuggest.uri?sort=plf-f&src=s&st1=%22lumbar%2Bspine%22%2BOR%2B%22Lumbar%2Bvertebrae%22%2BOR%2B%22Vertebrae%2c%2Blumbar%22%2BOR%2B%22thoracic%2Bvertebrae%22%2BOR%2B%22vertebrae%2c%2Bthoracic%22&st2=%22Bone%2BFracture%22%2BOR%2B%22Spiral%2BFracture%22%2BOR%2B%22Torsion%2BFractures%22%2BOR%2B%22Torsion%2BFracture%22%2BOR%2B%22Spinal%2BFractures%22%2BOR%2B%22Spinal%2BFracture%22%2BOR%2B%22thoracolumbar%2Bburst%2Bfracture%22%2BOR%2B%22spinal%2Bburst%2Bfracture%22%2BOR%2B%22burst%2Bfracture%2Bof%2Bthe%2Bthoracolumbar%2Bspine%22&searchTerms=Vertebroplasty%2BOR%2B%22Fracture%2BFixation%2cInternal%22%2BOR%2B%22Fracture%2BFixations%22%2BOR%2B%22Skeletal%2BFixation%22%2BOR%2B%22short-segment%2Bfixation%22%2BOR%2B%22long-segment%2Bfixation%22%2BOR%2B%22posterior%2Bshort-segment%2Bfixation%22%2BOR%2B%22Pedicle%2Bscrew%2Bfixation%22%2BOR%2B%22Posterior%2Bshort-segment%2Bfixation%22%3f%21%22%2A%24%22load-sharing%2Bclassification%22%2BOR%2B%22load%2Bsharing%2Bclassification%22%2BOR%2B%22load%2Bsharing%22%2BOR%2B%22load-sharing%22%2BOR%2B%22load%2Bsharing%2Bscore%22%2BOR%2B%22load-sharing%2Bscore%22%2BOR%2B%22McCormack%2Bscore%22%2BOR%2B%22McCormack%2Bclassification%22%2BOR%2B%22McCormack%2Bload-sharing%2Bclassification%22%3f%21%22%2A%24&sid=25283f5151ffadb82b00c9e00ba7016e&sot=b&sdt=b&sl=923&s=%28%2BTITLE-ABS-KEY%2B%28%2B%22lumbar%2Bspine%22%2BOR%2B%22Lumbar%2Bvertebrae%22%2BOR%2B%22Vertebrae%2c%2Blumbar%22%2BOR%2B%22thoracic%2Bvertebrae%22%2BOR%2B%22vertebrae%2c%2Bthoracic%22%2B%29%2BAND%2BTITLE-ABS-KEY%2B%28%2B%22Bone%2BFracture%22%2BOR%2B%22Spiral%2BFracture%22%2BOR%2B%22Torsion%2BFractures%22%2BOR%2B%22Torsion%2BFracture%22%2BOR%2B%22Spinal%2BFractures%22%2BOR%2B%22Spinal%2BFracture%22%2BOR%2B%22thoracolumbar%2Bburst%2Bfracture%22%2BOR%2B%22spinal%2Bburst%2Bfracture%22%2BOR%2B%22burst%2Bfracture%2Boff%2Bthe%2Bthoracolumbar%2Bspine%22%2B%29%2BAND%2BTITLE-ABS-KEY%2B%28%2Benteroplasty%2BOR%2B%22Fracture%2BFixation%2c%2BInternal%22%2BOR%2B%22Fracture%2BFixations%22%2BOR%2B%22Skeletal%2BFixation%22) [Fracture" OR "thoracolumbar burst fracture" OR "spinal burst](https://www-scopus.ez68.periodicos.capes.gov.br/results/documentSpellSuggest.uri?sort=plf-f&src=s&st1=%22lumbar%2Bspine%22%2BOR%2B%22Lumbar%2Bvertebrae%22%2BOR%2B%22Vertebrae%2c%2Blumbar%22%2BOR%2B%22thoracic%2Bvertebrae%22%2BOR%2B%22vertebrae%2c%2Bthoracic%22&st2=%22Bone%2BFracture%22%2BOR%2B%22Spiral%2BFracture%22%2BOR%2B%22Torsion%2BFractures%22%2BOR%2B%22Torsion%2BFracture%22%2BOR%2B%22Spinal%2BFractures%22%2BOR%2B%22Spinal%2BFracture%22%2BOR%2B%22thoracolumbar%2Bburst%2Bfracture%22%2BOR%2B%22spinal%2Bburst%2Bfracture%22%2BOR%2B%22burst%2Bfracture%2Bof%2Bthe%2Bthoracolumbar%2Bspine%22&searchTerms=Vertebroplasty%2BOR%2B%22Fracture%2BFixation%2cInternal%22%2BOR%2B%22Fracture%2BFixations%22%2BOR%2B%22Skeletal%2BFixation%22%2BOR%2B%22short-segment%2Bfixation%22%2BOR%2B%22long-segment%2Bfixation%22%2BOR%2B%22posterior%2Bshort-segment%2Bfixation%22%2BOR%2B%22Pedicle%2Bscrew%2Bfixation%22%2BOR%2B%22Posterior%2Bshort-segment%2Bfixation%22%3f%21%22%2A%24%22load-sharing%2Bclassification%22%2BOR%2B%22load%2Bsharing%2Bclassification%22%2BOR%2B%22load%2Bsharing%22%2BOR%2B%22load-sharing%22%2BOR%2B%22load%2Bsharing%2Bscore%22%2BOR%2B%22load-sharing%2Bscore%22%2BOR%2B%22McCormack%2Bscore%22%2BOR%2B%22McCormack%2Bclassification%22%2BOR%2B%22McCormack%2Bload-sharing%2Bclassification%22%3f%21%22%2A%24&sid=25283f5151ffadb82b00c9e00ba7016e&sot=b&sdt=b&sl=923&s=%28%2BTITLE-ABS-KEY%2B%28%2B%22lumbar%2Bspine%22%2BOR%2B%22Lumbar%2Bvertebrae%22%2BOR%2B%22Vertebrae%2c%2Blumbar%22%2BOR%2B%22thoracic%2Bvertebrae%22%2BOR%2B%22vertebrae%2c%2Bthoracic%22%2B%29%2BAND%2BTITLE-ABS-KEY%2B%28%2B%22Bone%2BFracture%22%2BOR%2B%22Spiral%2BFracture%22%2BOR%2B%22Torsion%2BFractures%22%2BOR%2B%22Torsion%2BFracture%22%2BOR%2B%22Spinal%2BFractures%22%2BOR%2B%22Spinal%2BFracture%22%2BOR%2B%22thoracolumbar%2Bburst%2Bfracture%22%2BOR%2B%22spinal%2Bburst%2Bfracture%22%2BOR%2B%22burst%2Bfracture%2Boff%2Bthe%2Bthoracolumbar%2Bspine%22%2B%29%2BAND%2BTITLE-ABS-KEY%2B%28%2Benteroplasty%2BOR%2B%22Fracture%2BFixation%2c%2BInternal%22%2BOR%2B%22Fracture%2BFixations%22%2BOR%2B%22Skeletal%2BFixation%22) [fracture" OR "burst fracture off the thoracolumbar spine" ) AND TITLE-](https://www-scopus.ez68.periodicos.capes.gov.br/results/documentSpellSuggest.uri?sort=plf-f&src=s&st1=%22lumbar%2Bspine%22%2BOR%2B%22Lumbar%2Bvertebrae%22%2BOR%2B%22Vertebrae%2c%2Blumbar%22%2BOR%2B%22thoracic%2Bvertebrae%22%2BOR%2B%22vertebrae%2c%2Bthoracic%22&st2=%22Bone%2BFracture%22%2BOR%2B%22Spiral%2BFracture%22%2BOR%2B%22Torsion%2BFractures%22%2BOR%2B%22Torsion%2BFracture%22%2BOR%2B%22Spinal%2BFractures%22%2BOR%2B%22Spinal%2BFracture%22%2BOR%2B%22thoracolumbar%2Bburst%2Bfracture%22%2BOR%2B%22spinal%2Bburst%2Bfracture%22%2BOR%2B%22burst%2Bfracture%2Bof%2Bthe%2Bthoracolumbar%2Bspine%22&searchTerms=Vertebroplasty%2BOR%2B%22Fracture%2BFixation%2cInternal%22%2BOR%2B%22Fracture%2BFixations%22%2BOR%2B%22Skeletal%2BFixation%22%2BOR%2B%22short-segment%2Bfixation%22%2BOR%2B%22long-segment%2Bfixation%22%2BOR%2B%22posterior%2Bshort-segment%2Bfixation%22%2BOR%2B%22Pedicle%2Bscrew%2Bfixation%22%2BOR%2B%22Posterior%2Bshort-segment%2Bfixation%22%3f%21%22%2A%24%22load-sharing%2Bclassification%22%2BOR%2B%22load%2Bsharing%2Bclassification%22%2BOR%2B%22load%2Bsharing%22%2BOR%2B%22load-sharing%22%2BOR%2B%22load%2Bsharing%2Bscore%22%2BOR%2B%22load-sharing%2Bscore%22%2BOR%2B%22McCormack%2Bscore%22%2BOR%2B%22McCormack%2Bclassification%22%2BOR%2B%22McCormack%2Bload-sharing%2Bclassification%22%3f%21%22%2A%24&sid=25283f5151ffadb82b00c9e00ba7016e&sot=b&sdt=b&sl=923&s=%28%2BTITLE-ABS-KEY%2B%28%2B%22lumbar%2Bspine%22%2BOR%2B%22Lumbar%2Bvertebrae%22%2BOR%2B%22Vertebrae%2c%2Blumbar%22%2BOR%2B%22thoracic%2Bvertebrae%22%2BOR%2B%22vertebrae%2c%2Bthoracic%22%2B%29%2BAND%2BTITLE-ABS-KEY%2B%28%2B%22Bone%2BFracture%22%2BOR%2B%22Spiral%2BFracture%22%2BOR%2B%22Torsion%2BFractures%22%2BOR%2B%22Torsion%2BFracture%22%2BOR%2B%22Spinal%2BFractures%22%2BOR%2B%22Spinal%2BFracture%22%2BOR%2B%22thoracolumbar%2Bburst%2Bfracture%22%2BOR%2B%22spinal%2Bburst%2Bfracture%22%2BOR%2B%22burst%2Bfracture%2Boff%2Bthe%2Bthoracolumbar%2Bspine%22%2B%29%2BAND%2BTITLE-ABS-KEY%2B%28%2Benteroplasty%2BOR%2B%22Fracture%2BFixation%2c%2BInternal%22%2BOR%2B%22Fracture%2BFixations%22%2BOR%2B%22Skeletal%2BFixation%22) [ABS-KEY ( enteroplasty OR "Fracture Fixation, Internal" OR "Fracture](https://www-scopus.ez68.periodicos.capes.gov.br/results/documentSpellSuggest.uri?sort=plf-f&src=s&st1=%22lumbar%2Bspine%22%2BOR%2B%22Lumbar%2Bvertebrae%22%2BOR%2B%22Vertebrae%2c%2Blumbar%22%2BOR%2B%22thoracic%2Bvertebrae%22%2BOR%2B%22vertebrae%2c%2Bthoracic%22&st2=%22Bone%2BFracture%22%2BOR%2B%22Spiral%2BFracture%22%2BOR%2B%22Torsion%2BFractures%22%2BOR%2B%22Torsion%2BFracture%22%2BOR%2B%22Spinal%2BFractures%22%2BOR%2B%22Spinal%2BFracture%22%2BOR%2B%22thoracolumbar%2Bburst%2Bfracture%22%2BOR%2B%22spinal%2Bburst%2Bfracture%22%2BOR%2B%22burst%2Bfracture%2Bof%2Bthe%2Bthoracolumbar%2Bspine%22&searchTerms=Vertebroplasty%2BOR%2B%22Fracture%2BFixation%2cInternal%22%2BOR%2B%22Fracture%2BFixations%22%2BOR%2B%22Skeletal%2BFixation%22%2BOR%2B%22short-segment%2Bfixation%22%2BOR%2B%22long-segment%2Bfixation%22%2BOR%2B%22posterior%2Bshort-segment%2Bfixation%22%2BOR%2B%22Pedicle%2Bscrew%2Bfixation%22%2BOR%2B%22Posterior%2Bshort-segment%2Bfixation%22%3f%21%22%2A%24%22load-sharing%2Bclassification%22%2BOR%2B%22load%2Bsharing%2Bclassification%22%2BOR%2B%22load%2Bsharing%22%2BOR%2B%22load-sharing%22%2BOR%2B%22load%2Bsharing%2Bscore%22%2BOR%2B%22load-sharing%2Bscore%22%2BOR%2B%22McCormack%2Bscore%22%2BOR%2B%22McCormack%2Bclassification%22%2BOR%2B%22McCormack%2Bload-sharing%2Bclassification%22%3f%21%22%2A%24&sid=25283f5151ffadb82b00c9e00ba7016e&sot=b&sdt=b&sl=923&s=%28%2BTITLE-ABS-KEY%2B%28%2B%22lumbar%2Bspine%22%2BOR%2B%22Lumbar%2Bvertebrae%22%2BOR%2B%22Vertebrae%2c%2Blumbar%22%2BOR%2B%22thoracic%2Bvertebrae%22%2BOR%2B%22vertebrae%2c%2Bthoracic%22%2B%29%2BAND%2BTITLE-ABS-KEY%2B%28%2B%22Bone%2BFracture%22%2BOR%2B%22Spiral%2BFracture%22%2BOR%2B%22Torsion%2BFractures%22%2BOR%2B%22Torsion%2BFracture%22%2BOR%2B%22Spinal%2BFractures%22%2BOR%2B%22Spinal%2BFracture%22%2BOR%2B%22thoracolumbar%2Bburst%2Bfracture%22%2BOR%2B%22spinal%2Bburst%2Bfracture%22%2BOR%2B%22burst%2Bfracture%2Boff%2Bthe%2Bthoracolumbar%2Bspine%22%2B%29%2BAND%2BTITLE-ABS-KEY%2B%28%2Benteroplasty%2BOR%2B%22Fracture%2BFixation%2c%2BInternal%22%2BOR%2B%22Fracture%2BFixations%22%2BOR%2B%22Skeletal%2BFixation%22) [Fixations" OR "Skeletal Fixation" OR "short-segment fixation" OR "long-](https://www-scopus.ez68.periodicos.capes.gov.br/results/documentSpellSuggest.uri?sort=plf-f&src=s&st1=%22lumbar%2Bspine%22%2BOR%2B%22Lumbar%2Bvertebrae%22%2BOR%2B%22Vertebrae%2c%2Blumbar%22%2BOR%2B%22thoracic%2Bvertebrae%22%2BOR%2B%22vertebrae%2c%2Bthoracic%22&st2=%22Bone%2BFracture%22%2BOR%2B%22Spiral%2BFracture%22%2BOR%2B%22Torsion%2BFractures%22%2BOR%2B%22Torsion%2BFracture%22%2BOR%2B%22Spinal%2BFractures%22%2BOR%2B%22Spinal%2BFracture%22%2BOR%2B%22thoracolumbar%2Bburst%2Bfracture%22%2BOR%2B%22spinal%2Bburst%2Bfracture%22%2BOR%2B%22burst%2Bfracture%2Bof%2Bthe%2Bthoracolumbar%2Bspine%22&searchTerms=Vertebroplasty%2BOR%2B%22Fracture%2BFixation%2cInternal%22%2BOR%2B%22Fracture%2BFixations%22%2BOR%2B%22Skeletal%2BFixation%22%2BOR%2B%22short-segment%2Bfixation%22%2BOR%2B%22long-segment%2Bfixation%22%2BOR%2B%22posterior%2Bshort-segment%2Bfixation%22%2BOR%2B%22Pedicle%2Bscrew%2Bfixation%22%2BOR%2B%22Posterior%2Bshort-segment%2Bfixation%22%3f%21%22%2A%24%22load-sharing%2Bclassification%22%2BOR%2B%22load%2Bsharing%2Bclassification%22%2BOR%2B%22load%2Bsharing%22%2BOR%2B%22load-sharing%22%2BOR%2B%22load%2Bsharing%2Bscore%22%2BOR%2B%22load-sharing%2Bscore%22%2BOR%2B%22McCormack%2Bscore%22%2BOR%2B%22McCormack%2Bclassification%22%2BOR%2B%22McCormack%2Bload-sharing%2Bclassification%22%3f%21%22%2A%24&sid=25283f5151ffadb82b00c9e00ba7016e&sot=b&sdt=b&sl=923&s=%28%2BTITLE-ABS-KEY%2B%28%2B%22lumbar%2Bspine%22%2BOR%2B%22Lumbar%2Bvertebrae%22%2BOR%2B%22Vertebrae%2c%2Blumbar%22%2BOR%2B%22thoracic%2Bvertebrae%22%2BOR%2B%22vertebrae%2c%2Bthoracic%22%2B%29%2BAND%2BTITLE-ABS-KEY%2B%28%2B%22Bone%2BFracture%22%2BOR%2B%22Spiral%2BFracture%22%2BOR%2B%22Torsion%2BFractures%22%2BOR%2B%22Torsion%2BFracture%22%2BOR%2B%22Spinal%2BFractures%22%2BOR%2B%22Spinal%2BFracture%22%2BOR%2B%22thoracolumbar%2Bburst%2Bfracture%22%2BOR%2B%22spinal%2Bburst%2Bfracture%22%2BOR%2B%22burst%2Bfracture%2Boff%2Bthe%2Bthoracolumbar%2Bspine%22%2B%29%2BAND%2BTITLE-ABS-KEY%2B%28%2Benteroplasty%2BOR%2B%22Fracture%2BFixation%2c%2BInternal%22%2BOR%2B%22Fracture%2BFixations%22%2BOR%2B%22Skeletal%2BFixation%22) [segment fixation" OR "posterior short-segment fixation" OR "Pedicle](https://www-scopus.ez68.periodicos.capes.gov.br/results/documentSpellSuggest.uri?sort=plf-f&src=s&st1=%22lumbar%2Bspine%22%2BOR%2B%22Lumbar%2Bvertebrae%22%2BOR%2B%22Vertebrae%2c%2Blumbar%22%2BOR%2B%22thoracic%2Bvertebrae%22%2BOR%2B%22vertebrae%2c%2Bthoracic%22&st2=%22Bone%2BFracture%22%2BOR%2B%22Spiral%2BFracture%22%2BOR%2B%22Torsion%2BFractures%22%2BOR%2B%22Torsion%2BFracture%22%2BOR%2B%22Spinal%2BFractures%22%2BOR%2B%22Spinal%2BFracture%22%2BOR%2B%22thoracolumbar%2Bburst%2Bfracture%22%2BOR%2B%22spinal%2Bburst%2Bfracture%22%2BOR%2B%22burst%2Bfracture%2Bof%2Bthe%2Bthoracolumbar%2Bspine%22&searchTerms=Vertebroplasty%2BOR%2B%22Fracture%2BFixation%2cInternal%22%2BOR%2B%22Fracture%2BFixations%22%2BOR%2B%22Skeletal%2BFixation%22%2BOR%2B%22short-segment%2Bfixation%22%2BOR%2B%22long-segment%2Bfixation%22%2BOR%2B%22posterior%2Bshort-segment%2Bfixation%22%2BOR%2B%22Pedicle%2Bscrew%2Bfixation%22%2BOR%2B%22Posterior%2Bshort-segment%2Bfixation%22%3f%21%22%2A%24%22load-sharing%2Bclassification%22%2BOR%2B%22load%2Bsharing%2Bclassification%22%2BOR%2B%22load%2Bsharing%22%2BOR%2B%22load-sharing%22%2BOR%2B%22load%2Bsharing%2Bscore%22%2BOR%2B%22load-sharing%2Bscore%22%2BOR%2B%22McCormack%2Bscore%22%2BOR%2B%22McCormack%2Bclassification%22%2BOR%2B%22McCormack%2Bload-sharing%2Bclassification%22%3f%21%22%2A%24&sid=25283f5151ffadb82b00c9e00ba7016e&sot=b&sdt=b&sl=923&s=%28%2BTITLE-ABS-KEY%2B%28%2B%22lumbar%2Bspine%22%2BOR%2B%22Lumbar%2Bvertebrae%22%2BOR%2B%22Vertebrae%2c%2Blumbar%22%2BOR%2B%22thoracic%2Bvertebrae%22%2BOR%2B%22vertebrae%2c%2Bthoracic%22%2B%29%2BAND%2BTITLE-ABS-KEY%2B%28%2B%22Bone%2BFracture%22%2BOR%2B%22Spiral%2BFracture%22%2BOR%2B%22Torsion%2BFractures%22%2BOR%2B%22Torsion%2BFracture%22%2BOR%2B%22Spinal%2BFractures%22%2BOR%2B%22Spinal%2BFracture%22%2BOR%2B%22thoracolumbar%2Bburst%2Bfracture%22%2BOR%2B%22spinal%2Bburst%2Bfracture%22%2BOR%2B%22burst%2Bfracture%2Boff%2Bthe%2Bthoracolumbar%2Bspine%22%2B%29%2BAND%2BTITLE-ABS-KEY%2B%28%2Benteroplasty%2BOR%2B%22Fracture%2BFixation%2c%2BInternal%22%2BOR%2B%22Fracture%2BFixations%22%2BOR%2B%22Skeletal%2BFixation%22) [screw fixation" OR "Posterior short-segment fixation" ) AND TITLE-ABS-](https://www-scopus.ez68.periodicos.capes.gov.br/results/documentSpellSuggest.uri?sort=plf-f&src=s&st1=%22lumbar%2Bspine%22%2BOR%2B%22Lumbar%2Bvertebrae%22%2BOR%2B%22Vertebrae%2c%2Blumbar%22%2BOR%2B%22thoracic%2Bvertebrae%22%2BOR%2B%22vertebrae%2c%2Bthoracic%22&st2=%22Bone%2BFracture%22%2BOR%2B%22Spiral%2BFracture%22%2BOR%2B%22Torsion%2BFractures%22%2BOR%2B%22Torsion%2BFracture%22%2BOR%2B%22Spinal%2BFractures%22%2BOR%2B%22Spinal%2BFracture%22%2BOR%2B%22thoracolumbar%2Bburst%2Bfracture%22%2BOR%2B%22spinal%2Bburst%2Bfracture%22%2BOR%2B%22burst%2Bfracture%2Bof%2Bthe%2Bthoracolumbar%2Bspine%22&searchTerms=Vertebroplasty%2BOR%2B%22Fracture%2BFixation%2cInternal%22%2BOR%2B%22Fracture%2BFixations%22%2BOR%2B%22Skeletal%2BFixation%22%2BOR%2B%22short-segment%2Bfixation%22%2BOR%2B%22long-segment%2Bfixation%22%2BOR%2B%22posterior%2Bshort-segment%2Bfixation%22%2BOR%2B%22Pedicle%2Bscrew%2Bfixation%22%2BOR%2B%22Posterior%2Bshort-segment%2Bfixation%22%3f%21%22%2A%24%22load-sharing%2Bclassification%22%2BOR%2B%22load%2Bsharing%2Bclassification%22%2BOR%2B%22load%2Bsharing%22%2BOR%2B%22load-sharing%22%2BOR%2B%22load%2Bsharing%2Bscore%22%2BOR%2B%22load-sharing%2Bscore%22%2BOR%2B%22McCormack%2Bscore%22%2BOR%2B%22McCormack%2Bclassification%22%2BOR%2B%22McCormack%2Bload-sharing%2Bclassification%22%3f%21%22%2A%24&sid=25283f5151ffadb82b00c9e00ba7016e&sot=b&sdt=b&sl=923&s=%28%2BTITLE-ABS-KEY%2B%28%2B%22lumbar%2Bspine%22%2BOR%2B%22Lumbar%2Bvertebrae%22%2BOR%2B%22Vertebrae%2c%2Blumbar%22%2BOR%2B%22thoracic%2Bvertebrae%22%2BOR%2B%22vertebrae%2c%2Bthoracic%22%2B%29%2BAND%2BTITLE-ABS-KEY%2B%28%2B%22Bone%2BFracture%22%2BOR%2B%22Spiral%2BFracture%22%2BOR%2B%22Torsion%2BFractures%22%2BOR%2B%22Torsion%2BFracture%22%2BOR%2B%22Spinal%2BFractures%22%2BOR%2B%22Spinal%2BFracture%22%2BOR%2B%22thoracolumbar%2Bburst%2Bfracture%22%2BOR%2B%22spinal%2Bburst%2Bfracture%22%2BOR%2B%22burst%2Bfracture%2Boff%2Bthe%2Bthoracolumbar%2Bspine%22%2B%29%2BAND%2BTITLE-ABS-KEY%2B%28%2Benteroplasty%2BOR%2B%22Fracture%2BFixation%2c%2BInternal%22%2BOR%2B%22Fracture%2BFixations%22%2BOR%2B%22Skeletal%2BFixation%22) [KEY ( "load-sharing classification" OR "load sharing](https://www-scopus.ez68.periodicos.capes.gov.br/results/documentSpellSuggest.uri?sort=plf-f&src=s&st1=%22lumbar%2Bspine%22%2BOR%2B%22Lumbar%2Bvertebrae%22%2BOR%2B%22Vertebrae%2c%2Blumbar%22%2BOR%2B%22thoracic%2Bvertebrae%22%2BOR%2B%22vertebrae%2c%2Bthoracic%22&st2=%22Bone%2BFracture%22%2BOR%2B%22Spiral%2BFracture%22%2BOR%2B%22Torsion%2BFractures%22%2BOR%2B%22Torsion%2BFracture%22%2BOR%2B%22Spinal%2BFractures%22%2BOR%2B%22Spinal%2BFracture%22%2BOR%2B%22thoracolumbar%2Bburst%2Bfracture%22%2BOR%2B%22spinal%2Bburst%2Bfracture%22%2BOR%2B%22burst%2Bfracture%2Bof%2Bthe%2Bthoracolumbar%2Bspine%22&searchTerms=Vertebroplasty%2BOR%2B%22Fracture%2BFixation%2cInternal%22%2BOR%2B%22Fracture%2BFixations%22%2BOR%2B%22Skeletal%2BFixation%22%2BOR%2B%22short-segment%2Bfixation%22%2BOR%2B%22long-segment%2Bfixation%22%2BOR%2B%22posterior%2Bshort-segment%2Bfixation%22%2BOR%2B%22Pedicle%2Bscrew%2Bfixation%22%2BOR%2B%22Posterior%2Bshort-segment%2Bfixation%22%3f%21%22%2A%24%22load-sharing%2Bclassification%22%2BOR%2B%22load%2Bsharing%2Bclassification%22%2BOR%2B%22load%2Bsharing%22%2BOR%2B%22load-sharing%22%2BOR%2B%22load%2Bsharing%2Bscore%22%2BOR%2B%22load-sharing%2Bscore%22%2BOR%2B%22McCormack%2Bscore%22%2BOR%2B%22McCormack%2Bclassification%22%2BOR%2B%22McCormack%2Bload-sharing%2Bclassification%22%3f%21%22%2A%24&sid=25283f5151ffadb82b00c9e00ba7016e&sot=b&sdt=b&sl=923&s=%28%2BTITLE-ABS-KEY%2B%28%2B%22lumbar%2Bspine%22%2BOR%2B%22Lumbar%2Bvertebrae%22%2BOR%2B%22Vertebrae%2c%2Blumbar%22%2BOR%2B%22thoracic%2Bvertebrae%22%2BOR%2B%22vertebrae%2c%2Bthoracic%22%2B%29%2BAND%2BTITLE-ABS-KEY%2B%28%2B%22Bone%2BFracture%22%2BOR%2B%22Spiral%2BFracture%22%2BOR%2B%22Torsion%2BFractures%22%2BOR%2B%22Torsion%2BFracture%22%2BOR%2B%22Spinal%2BFractures%22%2BOR%2B%22Spinal%2BFracture%22%2BOR%2B%22thoracolumbar%2Bburst%2Bfracture%22%2BOR%2B%22spinal%2Bburst%2Bfracture%22%2BOR%2B%22burst%2Bfracture%2Boff%2Bthe%2Bthoracolumbar%2Bspine%22%2B%29%2BAND%2BTITLE-ABS-KEY%2B%28%2Benteroplasty%2BOR%2B%22Fracture%2BFixation%2c%2BInternal%22%2BOR%2B%22Fracture%2BFixations%22%2BOR%2B%22Skeletal%2BFixation%22) [classification" OR "load sharing" OR "load-sharing" OR "load sharing](https://www-scopus.ez68.periodicos.capes.gov.br/results/documentSpellSuggest.uri?sort=plf-f&src=s&st1=%22lumbar%2Bspine%22%2BOR%2B%22Lumbar%2Bvertebrae%22%2BOR%2B%22Vertebrae%2c%2Blumbar%22%2BOR%2B%22thoracic%2Bvertebrae%22%2BOR%2B%22vertebrae%2c%2Bthoracic%22&st2=%22Bone%2BFracture%22%2BOR%2B%22Spiral%2BFracture%22%2BOR%2B%22Torsion%2BFractures%22%2BOR%2B%22Torsion%2BFracture%22%2BOR%2B%22Spinal%2BFractures%22%2BOR%2B%22Spinal%2BFracture%22%2BOR%2B%22thoracolumbar%2Bburst%2Bfracture%22%2BOR%2B%22spinal%2Bburst%2Bfracture%22%2BOR%2B%22burst%2Bfracture%2Bof%2Bthe%2Bthoracolumbar%2Bspine%22&searchTerms=Vertebroplasty%2BOR%2B%22Fracture%2BFixation%2cInternal%22%2BOR%2B%22Fracture%2BFixations%22%2BOR%2B%22Skeletal%2BFixation%22%2BOR%2B%22short-segment%2Bfixation%22%2BOR%2B%22long-segment%2Bfixation%22%2BOR%2B%22posterior%2Bshort-segment%2Bfixation%22%2BOR%2B%22Pedicle%2Bscrew%2Bfixation%22%2BOR%2B%22Posterior%2Bshort-segment%2Bfixation%22%3f%21%22%2A%24%22load-sharing%2Bclassification%22%2BOR%2B%22load%2Bsharing%2Bclassification%22%2BOR%2B%22load%2Bsharing%22%2BOR%2B%22load-sharing%22%2BOR%2B%22load%2Bsharing%2Bscore%22%2BOR%2B%22load-sharing%2Bscore%22%2BOR%2B%22McCormack%2Bscore%22%2BOR%2B%22McCormack%2Bclassification%22%2BOR%2B%22McCormack%2Bload-sharing%2Bclassification%22%3f%21%22%2A%24&sid=25283f5151ffadb82b00c9e00ba7016e&sot=b&sdt=b&sl=923&s=%28%2BTITLE-ABS-KEY%2B%28%2B%22lumbar%2Bspine%22%2BOR%2B%22Lumbar%2Bvertebrae%22%2BOR%2B%22Vertebrae%2c%2Blumbar%22%2BOR%2B%22thoracic%2Bvertebrae%22%2BOR%2B%22vertebrae%2c%2Bthoracic%22%2B%29%2BAND%2BTITLE-ABS-KEY%2B%28%2B%22Bone%2BFracture%22%2BOR%2B%22Spiral%2BFracture%22%2BOR%2B%22Torsion%2BFractures%22%2BOR%2B%22Torsion%2BFracture%22%2BOR%2B%22Spinal%2BFractures%22%2BOR%2B%22Spinal%2BFracture%22%2BOR%2B%22thoracolumbar%2Bburst%2Bfracture%22%2BOR%2B%22spinal%2Bburst%2Bfracture%22%2BOR%2B%22burst%2Bfracture%2Boff%2Bthe%2Bthoracolumbar%2Bspine%22%2B%29%2BAND%2BTITLE-ABS-KEY%2B%28%2Benteroplasty%2BOR%2B%22Fracture%2BFixation%2c%2BInternal%22%2BOR%2B%22Fracture%2BFixations%22%2BOR%2B%22Skeletal%2BFixation%22) [score" OR "load-sharing score" OR "mccormick score" OR "mccormick](https://www-scopus.ez68.periodicos.capes.gov.br/results/documentSpellSuggest.uri?sort=plf-f&src=s&st1=%22lumbar%2Bspine%22%2BOR%2B%22Lumbar%2Bvertebrae%22%2BOR%2B%22Vertebrae%2c%2Blumbar%22%2BOR%2B%22thoracic%2Bvertebrae%22%2BOR%2B%22vertebrae%2c%2Bthoracic%22&st2=%22Bone%2BFracture%22%2BOR%2B%22Spiral%2BFracture%22%2BOR%2B%22Torsion%2BFractures%22%2BOR%2B%22Torsion%2BFracture%22%2BOR%2B%22Spinal%2BFractures%22%2BOR%2B%22Spinal%2BFracture%22%2BOR%2B%22thoracolumbar%2Bburst%2Bfracture%22%2BOR%2B%22spinal%2Bburst%2Bfracture%22%2BOR%2B%22burst%2Bfracture%2Bof%2Bthe%2Bthoracolumbar%2Bspine%22&searchTerms=Vertebroplasty%2BOR%2B%22Fracture%2BFixation%2cInternal%22%2BOR%2B%22Fracture%2BFixations%22%2BOR%2B%22Skeletal%2BFixation%22%2BOR%2B%22short-segment%2Bfixation%22%2BOR%2B%22long-segment%2Bfixation%22%2BOR%2B%22posterior%2Bshort-segment%2Bfixation%22%2BOR%2B%22Pedicle%2Bscrew%2Bfixation%22%2BOR%2B%22Posterior%2Bshort-segment%2Bfixation%22%3f%21%22%2A%24%22load-sharing%2Bclassification%22%2BOR%2B%22load%2Bsharing%2Bclassification%22%2BOR%2B%22load%2Bsharing%22%2BOR%2B%22load-sharing%22%2BOR%2B%22load%2Bsharing%2Bscore%22%2BOR%2B%22load-sharing%2Bscore%22%2BOR%2B%22McCormack%2Bscore%22%2BOR%2B%22McCormack%2Bclassification%22%2BOR%2B%22McCormack%2Bload-sharing%2Bclassification%22%3f%21%22%2A%24&sid=25283f5151ffadb82b00c9e00ba7016e&sot=b&sdt=b&sl=923&s=%28%2BTITLE-ABS-KEY%2B%28%2B%22lumbar%2Bspine%22%2BOR%2B%22Lumbar%2Bvertebrae%22%2BOR%2B%22Vertebrae%2c%2Blumbar%22%2BOR%2B%22thoracic%2Bvertebrae%22%2BOR%2B%22vertebrae%2c%2Bthoracic%22%2B%29%2BAND%2BTITLE-ABS-KEY%2B%28%2B%22Bone%2BFracture%22%2BOR%2B%22Spiral%2BFracture%22%2BOR%2B%22Torsion%2BFractures%22%2BOR%2B%22Torsion%2BFracture%22%2BOR%2B%22Spinal%2BFractures%22%2BOR%2B%22Spinal%2BFracture%22%2BOR%2B%22thoracolumbar%2Bburst%2Bfracture%22%2BOR%2B%22spinal%2Bburst%2Bfracture%22%2BOR%2B%22burst%2Bfracture%2Boff%2Bthe%2Bthoracolumbar%2Bspine%22%2B%29%2BAND%2BTITLE-ABS-KEY%2B%28%2Benteroplasty%2BOR%2B%22Fracture%2BFixation%2c%2BInternal%22%2BOR%2B%22Fracture%2BFixations%22%2BOR%2B%22Skeletal%2BFixation%22) [classification" OR "mccormick load-sharing classification" ) )](https://www-scopus.ez68.periodicos.capes.gov.br/results/documentSpellSuggest.uri?sort=plf-f&src=s&st1=%22lumbar%2Bspine%22%2BOR%2B%22Lumbar%2Bvertebrae%22%2BOR%2B%22Vertebrae%2c%2Blumbar%22%2BOR%2B%22thoracic%2Bvertebrae%22%2BOR%2B%22vertebrae%2c%2Bthoracic%22&st2=%22Bone%2BFracture%22%2BOR%2B%22Spiral%2BFracture%22%2BOR%2B%22Torsion%2BFractures%22%2BOR%2B%22Torsion%2BFracture%22%2BOR%2B%22Spinal%2BFractures%22%2BOR%2B%22Spinal%2BFracture%22%2BOR%2B%22thoracolumbar%2Bburst%2Bfracture%22%2BOR%2B%22spinal%2Bburst%2Bfracture%22%2BOR%2B%22burst%2Bfracture%2Bof%2Bthe%2Bthoracolumbar%2Bspine%22&searchTerms=Vertebroplasty%2BOR%2B%22Fracture%2BFixation%2cInternal%22%2BOR%2B%22Fracture%2BFixations%22%2BOR%2B%22Skeletal%2BFixation%22%2BOR%2B%22short-segment%2Bfixation%22%2BOR%2B%22long-segment%2Bfixation%22%2BOR%2B%22posterior%2Bshort-segment%2Bfixation%22%2BOR%2B%22Pedicle%2Bscrew%2Bfixation%22%2BOR%2B%22Posterior%2Bshort-segment%2Bfixation%22%3f%21%22%2A%24%22load-sharing%2Bclassification%22%2BOR%2B%22load%2Bsharing%2Bclassification%22%2BOR%2B%22load%2Bsharing%22%2BOR%2B%22load-sharing%22%2BOR%2B%22load%2Bsharing%2Bscore%22%2BOR%2B%22load-sharing%2Bscore%22%2BOR%2B%22McCormack%2Bscore%22%2BOR%2B%22McCormack%2Bclassification%22%2BOR%2B%22McCormack%2Bload-sharing%2Bclassification%22%3f%21%22%2A%24&sid=25283f5151ffadb82b00c9e00ba7016e&sot=b&sdt=b&sl=923&s=%28%2BTITLE-ABS-KEY%2B%28%2B%22lumbar%2Bspine%22%2BOR%2B%22Lumbar%2Bvertebrae%22%2BOR%2B%22Vertebrae%2c%2Blumbar%22%2BOR%2B%22thoracic%2Bvertebrae%22%2BOR%2B%22vertebrae%2c%2Bthoracic%22%2B%29%2BAND%2BTITLE-ABS-KEY%2B%28%2B%22Bone%2BFracture%22%2BOR%2B%22Spiral%2BFracture%22%2BOR%2B%22Torsion%2BFractures%22%2BOR%2B%22Torsion%2BFracture%22%2BOR%2B%22Spinal%2BFractures%22%2BOR%2B%22Spinal%2BFracture%22%2BOR%2B%22thoracolumbar%2Bburst%2Bfracture%22%2BOR%2B%22spinal%2Bburst%2Bfracture%22%2BOR%2B%22burst%2Bfracture%2Boff%2Bthe%2Bthoracolumbar%2Bspine%22%2B%29%2BAND%2BTITLE-ABS-KEY%2B%28%2Benteroplasty%2BOR%2B%22Fracture%2BFixation%2c%2BInternal%22%2BOR%2B%22Fracture%2BFixations%22%2BOR%2B%22Skeletal%2BFixation%22) | **50** |
| **Web of Science** | #1 TS= (("lumbar spine" OR "Lumbar vertebrae" OR "Vertebrae, lumbar" OR "thoracic vertebrae" OR "vertebrae, thoracic") AND ("Fractures, Bone" OR "Broken Bones" OR "Bone, Broken" OR "Bones, Broken" OR "Broken Bone" OR "Bone Fractures" OR "Bone Fracture" OR "Fracture, Bone" OR "Spiral Fractures" OR "Fracture, Spiral" OR "Fractures, Spiral" OR "Spiral Fracture" OR "Torsion Fractures" OR "Fracture, Torsion" OR "Fractures, Torsion" OR "Torsion Fracture" OR "Spinal Fractures" OR "Fracture, Spinal" OR "Fractures, Spinal" OR "Spinal Fracture" OR Orthopedics OR Orthopedic OR "Orthopedic Surgery" OR "Orthopedic Surgeries" OR "Surgeries, Orthopedic" OR "Surgery, Orthopedic" OR "thoracolumbar burst fracture" OR "spinal burst fracture" OR "burst fracture of the thoracolumbar spine") AND (Vertebroplasty OR "Fracture Reduction" OR "Fracture Reductions" OR "Reduction, Fracture" OR "Reductions, Fracture" OR "Fracture Fixation, Internal" OR "Fixation, Fracture" OR "Fixations, Fracture" OR "Fracture Fixations" OR "Skeletal Fixation" OR "Fixation, Skeletal" OR "Fixations, Skeletal" OR "Skeletal Fixations" OR "short-segment fixation" OR "long- segment fixation" OR "posterior short-segment fixation" OR "short segment pedicle screw fixation" OR "Pedicle Screws" OR "Pedicle screw fixation" OR "posterior stabilization" OR "Posterior approach" OR "Posterior short-segment fixation" OR grafting OR spread OR "monosegmental transpedicular fixation" OR "Vertebral augmentation")) Índices=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI Tempo  estipulado=Todos os anos  #2 TS = ("load-sharing classification" OR "load sharing classification" OR "load sharing" OR "load-sharing" OR "load sharing score" OR "load-sharing score" OR "McCormack score" OR "McCormack classification" OR "McCormack load-sharing classification")  Índices=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI Tempo  estipulado=Todos os anos | **12** |

|  |  |  |
| --- | --- | --- |
|  | #3#2 AND #1  Índices=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI Tempo  estipulado=Todos os anos |  |
| **Lilacs (Portuguese and Spanish)** | (tw:(Coluna OR Columna)) AND (tw:("fratura toracolombar" OR “fratura explosão da coluna toracolombar” OR "fractura por estallido de la columna toracolumbar" OR "fixação curta" OR "fijación corta" OR "fixação longa" OR "fijación larga")) AND (tw:(Classificação OR clasificación OR McCormack OR "classificação de McCormack" OR "clasificación de McCormack")) | **15** |
| **EMBASE** | #1 ('lumbar spine'/exp OR 'lumbar spine' OR 'lumbar vertebrae'/exp OR 'lumbar vertebrae' OR 'vertebrae, lumbar' OR 'thoracic vertebrae'/exp OR 'thoracic vertebrae' OR 'vertebrae, thoracic') AND ('fractures, bone'/exp OR 'fractures, bone' OR 'broken bones' OR 'bone, broken' OR 'bones, broken' OR 'broken bone' OR 'bone fractures' OR 'bone fracture'/exp OR 'bone fracture' OR 'fracture, bone'OR 'spiral fractures' OR 'fracture, spiral' OR 'fractures, spiral' OR 'spiral fracture' OR 'torsion fractures' OR 'fracture, torsion' OR 'fractures, torsion' OR 'torsion fracture' OR 'spinal fractures'/exp OR 'spinal fractures' OR 'fracture, spinal' OR 'fractures, spinal' OR 'spinal fracture'/exp OR 'spinal fracture' OR 'orthopedics'/exp OR orthopedics OR orthopedic OR 'orthopedic surgery'/exp OR 'orthopedic surgery' OR 'orthopedic surgeries' OR 'surgeries, orthopedic' OR 'surgery, orthopedic'/exp OR 'surgery, orthopedic' OR 'thoracolumbar burst fracture'/exp OR 'thoracolumbar burst fracture' OR 'spinal burst fracture' OR 'burst fracture of the thoracolumbar spine') AND ('vertebroplasty'/exp OR vertebroplasty OR 'fracture reduction'/exp OR 'fracture reduction' OR 'fracture reductions' OR 'reduction, fracture'/exp OR 'reduction, fracture' OR 'reductions, fracture' OR 'fracture fixation, internal'/exp OR 'fracture fixation, internal' OR 'fixation, fracture' OR 'fixations, fracture' OR 'fracture fixations' OR 'skeletal fixation' OR 'fixation, skeletal' OR 'fixations, skeletal' OR 'skeletal fixations' OR 'short-segment fixation' OR 'long-segment fixation' OR 'short segment pedicle screw fixation' OR 'pedicle screws'/exp OR 'pedicle screws' OR 'pedicle screw fixation'/exp OR 'pedicle screw fixation' OR 'posterior stabilization' OR 'posterior approach'/exp OR 'posterior approach' OR 'posterior short-segment fixation' OR 'grafting'/exp OR grafting OR spread OR 'monosegmental transpedicular fixation' OR 'vertebral augmentation'/exp OR 'vertebral augmentation') AND [embase]/lim  #2 ('load-sharing classification' OR 'load sharing classification' OR 'load sharing' OR 'load-sharing' OR 'load sharing score' OR 'load-sharing score' OR 'mccormack score' OR 'mccormack classification' OR 'mccormack | **33** |

|  |  |  |
| --- | --- | --- |
|  | load-sharing classification') AND [embase]/lim #3 #1 AND #2 |  |
| **Open Grey** | ("lumbar spine" OR "Lumbar vertebrae" OR "thoracic vertebrae") AND (“Broken Bone” OR “Bone Fracture” OR “Spiral Fracture” OR “Torsion Fracture” OR “Spinal Fracture” OR Orthopedic OR “Orthopedic Surgery” OR “thoracolumbar burst fracture” OR “spinal burst fracture” OR “burst fracture of the thoracolumbar spine”) AND ( "Vertebroplasty" OR “Fracture Reduction” OR "Fracture Fixation, Internal" OR “Skeletal Fixation” OR “short-segment fixation” OR “long-segment fixation” OR “posterior short- segment fixation” OR “short segment pedicle screw fixation” OR "Pedicle Screws" OR "Pedicle screw fixation" OR “posterior stabilization” OR "Posterior approach" OR "Posterior short-segment fixation" OR “monosegmental transpedicular fixation” OR "Vertebral augmentation") AND (“load sharing classification” OR “load sharing” OR “load sharing score” OR “McCormack score” OR “McCormack classification” OR McCormack load-sharing classification”) | **0** |
| **Google Scholar** | With all words: ("Lumbar Vertebrae" OR "thoracic Vertebrae" OR "Thoracolumbar burst fracture" OR "burst fracture of the thoracolumbar spine" OR "Short segment fixation" OR "Long segment fixation") AND ("Load sharing classification" OR "McCormack classification")  With the exact term: "burst fracture of the thoracolumbar spine" AND "McCormak classification" | **60** |
| **JSTOR** | (((("Lumbar vertebrae" OR "thoracic vertebrae") AND (“thoracolumbar burst fracture” OR “burst fracture of the thoracolumbar spine”) AND (“short-segment fixation” OR “long-segment fixation”)) AND ("load-sharing classification” OR “McCormack classification”)) | **0** |

(tw:(Coluna OR Columna)) AND (tw:("fratura toracolombar" OR “fratura explosão da coluna toracolombar” OR "fractura por estallido de la columna toracolumbar")) AND (tw:( classificação OR Clasíficacion OR McCormack ))

Table 1

**Table 1 –** Summary of descriptive characteristics of included articles (n=9)

**Author, year, country, journal**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | **n (%) and P value** |  | |
| Alanay,2001 | 21 patients | Group I (7±0,8) | Group I TGP (n=11) | Group I | Group I | Intracorporeal transpedicular | High |
| Turkey | 34,8y±10,2 | Group II (7±1,1) | FU 53±18m | (3T12,3L1,1L2,4L3) | kpre18.7°±6.6° | grafting associated with |  |
| Europian  spine journal | (18-59y) |  | Group II non- TGP  (n=10) FU 44±18m | Group II  (3T12,4L1,2L2,1L3) | kpos 2,3°±5,7°  FU 7.9°±7,2°  Group II kpre 20,7°±5,9°  kpos 1,5°±4,4°  FU 10,5°±5,4°  p pre 0,481 pos 0,772  FU 0,364  1 breakage in group I 1 breakage in group II | shortsegment transpedicular  fixation of thoracolumbar burst fractures does not have a detectable effect on the rate of canal area restoration by indirect reduction or subsequent remodeling of the spinal canal area |  |
| Alanay,2001 | 20 patients | Group I (7±0,2) | Group I TGP(n=10) | Group I | Group I | Results in this study have | High |
| Turkey  Spine  Aono, 2017 | 35y (19-59)  62 patients | Group II (7±0,3)  Group I (7±1) | FU 34±3m  Group II NTGP (n=10) FU 35±5m  Group I WoVP(n=33) | (4T12,1L1,2L2,3L3)  Group II (3T12,3L1,2L2,2L3)  Group I | 5 patients had a  correction loss of more than 10° including one screw breakage (50%  failure) -10,2°±2° Group II  4 patients had a correction loss of more than 10° including one screw breakage (40% failure rate).9,5°±2°. According to failure rate NS (p= 1.000)  There was almost no | demonstrated that short-segment  fixation of thoracolumbar burst fractures is associated with a high rate of radiologic failure.  Transpedicular grafting of the injured vertebral body appears to be a safe procedure but is not effective in preventing correction loss and implant failure.  We found that temporary short- | High |
| Japan | 40y (13-69) | 3LSC9,8LSC8,11LSC7, | FU 36.9m (11.8) | (1T11,6T12,8L1,13L2,5L3) | loss of correction in | segment fixation yields |  |
| The spine |  | 9LSC6,2LSC5 | Group II VP (n=29) | Group II | either groups (with vs | satisfactory results in the |  |
| journal |  | 67%LSC>6  Group II (6,6±0,9) 4LSC8,12LSC7,9LSC6,  4LSC5  55%LSC>6 | FU 35.7m (11.5) | (4T12,13L1,10L2,2L3) | without vertebroplasty)  p=.702  1 screw breaking | reduction and maintenance of  fractured vertebrae with or without vertebroplasty. Kyphosis recurrence is due to the loss of disc height mostly after implant removal, with or without  vertebroplasty |  |

**Age in years Mean ±SD and/or Range**

**Load-sharing classification score**

**Groups (n\*) and treatments and follow up**

**Local of fracture And mechanism of trauma**

**Outcome Loss of kyphosis/ implant failure**

**Main Conclusions Risk of bias assessments**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Dai, 2009 | 73 patients | Group I fusion ≤6 | Group I (n=37) | Group I | Group I | Posterior short-segment fixation | Low |
| China | 34,6y (24-57) | 4,6±1,1 | FU 6,16y (5-7y) | (3T11,5T12,22L1,7L2) | kpre18.2°±11.3° | without fusion yielded |  |
| The jornal of |  | Group II n Fusion ≤6 | Group II (n=36) | Group II | kpos 0,6°±0,7° | satisfactory results similar to |  |
| bone and joint |  | 4,2±1,4 | FU 6,16y (5-7y) | (2T11,6T12,19L1,9L2) | FU 1,4°±1,6° | those of posterior fixation with |  |
| surgery |  |  |  | fall from a height 36 | Group II | fusion in patients with |  |
|  |  |  |  | patients, a motor-vehicle | kpre 18,7°±10.7° | thoracolumbar burst fractures |  |
|  |  |  |  | accident 19, a pedestrian- | kpos 0,5°±1° | with a load-sharing score of ≤6 |  |
|  |  |  |  | motor vehicle accident 13, | FU 1,7°±1,3° |  |  |
|  |  |  |  | a sports or work-related | The difference was not |  |  |
|  |  |  |  | injury 4, and a crush injury | significant between the |  |  |
|  |  |  |  | 1 | two groups at any time |  |  |
|  |  |  |  |  | interval (p > 0.05) |  |  |
|  |  |  |  |  | no breakage screw |  |  |
| Guven, 2009 | 72 patients | Group 1 (2 levels above e | Group 1 (n=18) | Group1 | Group I | We were not able to find any | Moderate |
| Turkey | 40y (22-50) | below) - 6,4 | FU 52.1m (SD:3.8) | (1T10,2T11,6T12,7L1,1L2,1 | Kpre 21.3°±11.1° | clinical difference, reinforcement |  |
| Clinical spine |  | Group 2 (2 levels above e | Group 2 (n=18) | L3) | kpos 6.5°±2.8° | with fracture level screw |  |
| surgery |  | below + screw fracture) – | FU 49.1m (SD:10.7) | Group2 | FU 8.2°±2.6° | combination can help in providing |  |
|  |  | 6,1 | Group 3 (n=18) | (1T11,9T12,6L1,1L2,1L3) | Group II | better kyphosis correction at |  |
|  |  | Group 3 (1 level above e | FU 48.1 (SD:13.8) | Group3 | kpre 20.3°±12.4° | studied parameters in patients |  |
|  |  | below) -6,4 | Group 4 (n=18) | (1T10,1T11,6T12,10L1) | kpos 5°±1.8° | treated with short-segment |  |
|  |  | Group 4 (1 level above e | FU 49.7 (SD:13.7) | Group4 | FU 7.2°±1.4° | fixation |  |
|  |  | below + screw fracture) - 6 |  | (1T11,9T12,7L1,1L2) | Group III |  |  |
|  |  |  |  | The majority of fractures | Kpre 20.6°±10.6° |  |  |
|  |  |  |  | resulted from car accidents | kpos 8.5°±2.2° |  |  |
|  |  |  |  | (60%) whereas 35% | FU 12.2°±3.6° |  |  |
|  |  |  |  | fractures were due to fall | Group IV |  |  |
|  |  |  |  | and 5% resulted from a | kpre 21.2°±10.4° |  |  |
|  |  |  |  | direct blow. | kpos 5.2°±1.2° |  |  |
|  |  |  |  |  | FU 8°±3.6° |  |  |
|  |  |  |  |  | During FU, KA |  |  |
|  |  |  |  |  | correction was more |  |  |
|  |  |  |  |  | maintained in groups 1, |  |  |
|  |  |  |  |  | 2, and 4 (P= 0.085) |  |  |
| Jiang, 2012 | 61 patients | Group I | Group I (n=31) | Group I | Group I | The percutaneous approach was | Moderate |
| China | 42.4y (18-60) | percutaneus(n=31) ≤6 | FU 58.3 ± 9.4m | (3T11,7T12,14L1,7L2) | Kpre 8.3°±5.2° | superior in terms of |  |
| The jornal of |  | 7LSC4, 8LSC5,16LSC6 | (37 – 84) | Group II | kpos -1.6°±4° | intraoperative blood loss |  |
| internacional |  | Group II | Group II (n=30) | (3T11,9T12,13L1,5L2) | FU 3.3°±2.7°(LKC) | anddurations of surgery and |  |
| medical |  | paraspinal (n=30) ≤6 | FU 59.0 ± 8.6m (37 – 84) | Fall from height 14, Motor | Group II | hospitalization and was |  |
| research |  | 8LSC4,8LSC5,14LSC6 |  | vehicle accident 30. Others | kpre 7.9°±5.9° | associated with significantly |  |
|  |  |  |  | 17 | kpos -9.4°±5.7° | better pain relief and functional |  |
|  |  |  |  |  | FU 2.3°±1.9°(LKC) | recovery at 3 months after |  |
|  |  |  |  |  | NS p≥0.05 | surgery than the paraspinal |  |
|  |  |  |  |  | No screw breakage ou | approach. In contrast, the |  |
|  |  |  |  |  | loosing | paraspinal approach resulted in |  |
|  |  |  |  |  |  | better fracture reduction and |  |
|  |  |  |  |  |  | deformity correction than the |  |
|  |  |  |  |  |  | percutaneous approach |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Korovessis, | 20 patientes | Group B(n=20) | Group B (n=20) | L2 L3 L4 | GARDNER angle | The observed 5° loss of correction | High |
| 2016, Greece | 44y±16 | LSC ≤ 6 | FU 48m (31-68) | fall from a height of traffic | Group B | at the final evaluation in the |  |
| Spine | Group B\* |  |  | accident | kpre 13°± 9.6° | spines of Group B (short-segment |  |
|  |  |  |  |  | kpos 6.7° ±5° p 0.036 | fixation) did not significantly |  |
|  |  |  |  |  | FU 11.8°± 5.6° p0.5 | influenced the final clinical |  |
|  |  |  |  |  | No screw breakage or | outcome. |  |
|  |  |  |  |  | loosing |  |  |
| Sun,2016 | 42 patients | Group A UPSF(n=20) | Group A UPSF (n=20) | Group A | Group A | Demonstrate that patients | High |
| China | Group A | LSC 7(n=12) or 8(n=8) | FU 18,3m | (2T11,7T12,7L1,4L2) | Kpre 15° ±3.4° | undergoing SSPI with UPSF as |  |
| International | 43,7y (36-57) | Average 7,4 | Group B BPSF (n=22) | Group B | Kpos 4.2°± 1° | compared with BPSF for the |  |
| Journal of | Group B | Group B BPSF (n=22) | FU 19m | (2T11,9T12,8L1,3L2) | FU 6.5°± 0.8° | management of severe TBFs had |  |
| surgery | 44,2y (37-58) | LSC 7(n=15) or 8(n=7) |  | Vehicle accident 14 | (Mean 2.3° (LKC) | similar clinical and radiologic |  |
|  |  | Average 7.3 |  | Falling 28 | Group B | outcomes |  |
|  |  |  |  |  | kpre 14.6°± 4.3° |  |  |
|  |  |  |  |  | kpos 4.6° ±1.3° |  |  |
|  |  |  |  |  | FU 7°± 0.9° |  |  |
|  |  |  |  |  | (mean 2.4°(LKC) |  |  |
|  |  |  |  |  | No screw breaking ou |  |  |
|  |  |  |  |  | loosing |  |  |
| Wei, 2010 | 85 patients | Group I MSPI (n=47) | Group I MSPI (n=47) | L1 39, L2 30, | Group I | This study demonstrated that | High |
| China | Group I | LSC 6,8±1 | Group II SSPI (n=38) | T11 and T12 16 | 3 patients had a | both MSPI and SSPI are effective |  |
| Spine | 39,3y±14 | Group II SSPI (n=38) | FU 27,8m±7 (19-52m) | falls from a height 65 | correction loss of 10°, | and reliable operative techniques |  |
|  | Group II | LSC 6,5±0,7 |  | direct traumas 11 | including 1 screw | for selected thoracolumbar burst |  |
|  | 42y±13 |  |  | vehicle acidentes 9 | loosening (6.38% failure | fractures. |  |
|  | (20-60y) |  |  |  | rate) |  |  |
|  |  |  |  |  | Group II |  |  |
|  |  |  |  |  | 2 patients had a |  |  |
|  |  |  |  |  | correction loss of 10°, |  |  |
|  |  |  |  |  | including 1 screw |  |  |
|  |  |  |  |  | breakage, (5.26% failure |  |  |
|  |  |  |  |  | rate) |  |  |
|  |  |  |  |  | NS failure rate (p = |  |  |
|  |  |  |  |  | 0.112). |  |  |

LSC –load sharing classification; kpre – kyphosis preoperative; kpos –kyphosis post-operative; TGP – transpedicular grafiting, NTGP – non-transpedicular grafiting; FU- follow up; WoVP- wilhout vertebroplasty; VP- vertebroplasty; NS – not significant; UPSF -unilateral pedicle screw fixation; BPSF- bilateral pedicle screw fixation; TBF- thoracolumbar burst fracture; MSPI- monosegmental pedicle instrumentation; SSPI- short-segment pedicle instrumentation; \*only group B included in study; LKC - loss of kyphosis corretion

Figure Legends

# 1 LEGENDS OF FIGURES, TABLES AND APPENDIX

2

1. **Figure 1** - Flow diagram of literature search and selection criteria
2. **Figure 2 –** Risk of bias analysis
3. **Figure 3 –** Florest plot for implant failure outcome with homogeneous sample
4. **Figure 4 –** Florest plot for LKC outcome with heterogeneous sample
5. **Figure 5 –** Florest plot for both outcomes with heterogeneous sample

8

9 **Table 1 -** Summary of descriptive characteristics of included articles (n=9)

10

11 **Appendix 1 –** Database search strategy

Figure 1

**Figure 1 -** Flow diagram of literature search and selection criteria1

PUBMED n= 74



**Identification**

COCHRANE

n= 5

SCOPUS n= 50

EMBASE n= 33

WEB OF SCIENCE n=12

LILACS n= 15

Records identified through database searching (n=189)

Records after duplicates removed (n=72)

JSTOR (n= 0)

OpenGrey (n= 0)

Google Scholar (n=60)

Records screened from databases (n=14)

Records screened from JSTOR

**Screening**

(n= 0)

Records screened from OpenGrey (n= 0)

Reference lists (n=0)

Records screened from Google Scholar (n=3)

Full-text articles assessed for eligibility (n=17)

**Eligibility**

Studies included in qualitative synthesis (n=9)

**Included**

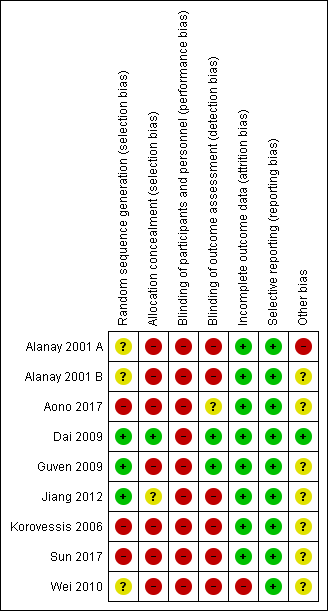
Full articles excluded with reasons (n=08)

1. - Reviews, Editorials, Letters, Conferences, Summaries, Books, Opinions (n=1),
2. - Cross-sectional, Case-control and Cohort studies. (n=6),
3. - study does not available by the author (n=1)

Studies included in quantitative synthesis (n=0)

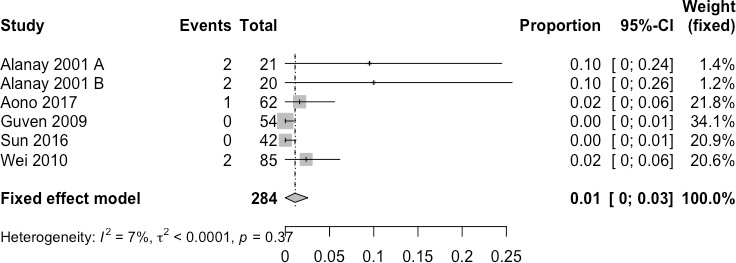
1 Adapted from PRISMA.

**Figure 2 –** Risk of bias analysis

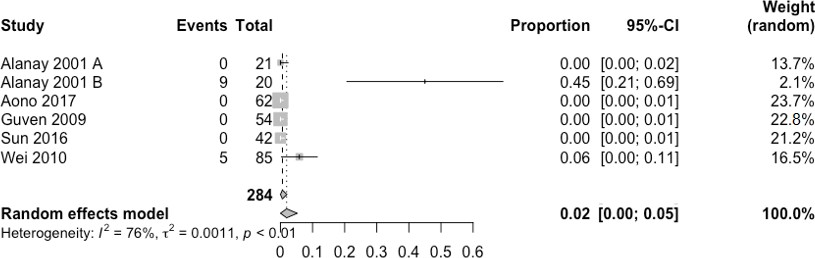


The graphics were performed by the 5.3.5 version of Review Manager software (Nordic Cochrane Center, Copenhagen, Denmark).

**Figure 3 –** Florest plot for implant failure outcome with homogeneous sample



**Figure 4 –** Florest plot for LKC outcome with heterogeneous sample



**Figure 5 –** Florest plot for both outcomes with heterogeneous sample

