Correction with Instrumented Fusion Versus Non-Corrective Surgery for Degenerative Lumbar Scoliosis: A Systematic Review

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Objective: *To evaluate the effect of surgical treatment between correction and non-correction surgery for degenerative lumbar scoliosis by systematic review method.*
Material and Method: *The database inclusions were PubMed (January 1, 1960 to March 31, 2009), EMBASE (January 1, 1985 to March 31, 2009), The Cochrane Central Register of Controlled Trials, CINAHL, Scopus, and various articles. Grey literature was searched from Scirus. The quality of the studies was graded by MINORS. Studies that were classified level I to IV were included in analysis of surgical treatment outcome in degenerative lumbar scoliosis. Patient centered outcomes, surgical outcomes, and complication were collected. Two reviewers independently assessed trial quality and extracted data.*
Results: *Seventeen studies were included in analysis comprising 598 patients with degenerative lumbar scoliosis and treated by operative treatment. Overall, 451 patients received correction procedure. All trials were non-randomized and non-comparative studies. Almost all level evidence of the study was level III to IV. Overall results were comparable between correction and non-corrective operation.*
Conclusion: *There were insufficient good-quality comparative studies for surgical treatment outcome comparing between corrective deformity and non-corrective procedures. The correction of deformity in degenerative lumbar scoliosis was classified Level 2C (very weak recommendations).*

Keywords: *Systematic review, Degenerative Lumbar Scoliosis, Correction, Surgery*

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Degenerative scoliosis is one of degenerative spine conditions that affect elderly patients. The incidence of disease is about 6% of the population and patients' average age is 50-60 years[1]. Natural history of disease has been undefined but Pricette et al study reported an average curve progression of 3.3 degree per year[2]. Several factors were proposed as the cause of curve progression to degenerative scoliosis. Those include the initial Cobb angle of more than 30 degree, lateral olisthesis more than 6 mm, and apical rotation greater than grade 3, according to Nash and Moe grading of spinal rotational deformity[3]. Clinical presentations of this disease are varied. Low back pain is the most common symptom, followed by others such as leg or "Sciatica" pain, neurogenic claudication, rarely neurological deficit, and uncommon for cosmetic problem. There are several modalities of degenerative lumbar scoliosis treatment such as non-operative treatment, which consist of medication (NSAIDs, analgesic drug, muscle relaxant, corticosteroid infiltration, epidural injection, and anxiolytic drug or antineuropathic drug for sciatica pain), non-medicational therapy (physical therapy, bracing, acupuncture, education such as lose weight advisory in obese patients and aerobic conditioning and flexibility exercise)[4], and surgical treatment[5]. Surgical treatments are usually considered for failed conservative treatment or severe clinical symptoms. Procedure options largely depended on individual patient's condition and surgeon preference such as decompression alone, decompression and fusion, decompression and posterior corrective instrumented fusion, and decompression and combined antero-posterior instrumented fusion. Many surgeons have debated about the option of correction or

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non-correction procedure in this condition. Several clinical studies reported clinical improvement in correction of deformity greater than non-correction surgery. Hanley recommended decompression with a combination of segmental correction and fusion with instrumentation for patients with a diagnosis of spinal stenosis and concomitant degenerative scoliosis who have not responded to appropriate non-surgical treatment measures[6]. However, they also presented considerable complications in the corrective procedure. Especially, those elderly patients who have a large number of medical conditions such as cardiovascular, pulmonary, and renal diseases prone to peri-operative complication from major surgery. Cho et al[7] reported 68% of complication rate from posterior corrective instrumented fusion compared with 28% of decompression alone and 17% of decompression and fusion according to the Martin et al trial. Inconsistencies in the results of surgery were many because of the study design and type of procedure. The aim of the present study was to perform a systematic review of the literature for evaluation of surgical treatment outcome in degenerative lumbar scoliosis. The hypothesis of the present study was that there was no difference in surgical results of degenerative lumbar scoliosis treatment between corrective deformity surgery and non-corrective surgery.

Material and Method

Search strategy

Electronic database (Pubmed [between January 1, 1960 and January 31, 2008], MEDLINE, Excerpta Medica [EMBASE], The Cochrane Central Register of Controlled Trials [CENTRAL], Cumulative Index to Nursing, and Allied Health Literature [CINAHL], Scopus) were searched for degenerative scoliosis and limit to human according to medical subject heading by using a maximally sensitive strategy. The search was refined with Boolean operators (AND/OR). The search was performed with English language publication. The references of each article were reviewed by hand to identify additional studies. Grey literature was searched for unpublished data from Scirus.

Selection criteria

The authors included randomized controlled trials (RCTs), controlled clinical trials (CCTs) with quasi-randomized methods (methods of allocating participants to a treatment that are not strictly random *e.g.* by date of birth, hospital record number, or alternation), retrospective studies, and case series or level I-IV from level of evidence (Table 1)[8,9]. Expert opinion studies were excluded.

Types of participants

Patients over age 18 with degenerative scoliosis, which is defined as “de novo” form spinal deformity in a skeletally mature patient with a Cobb angle of more than 10 degrees in the coronal plain, were included in this study. Curve localization was defined as the thoracolumbar or lumbar spine region with apex of curve at T12 and L1 or intervertebral disc space T12-L1for thoracolumbar curve and inter-vertebral disc space L1-2 to L5 for lumbar curve[10].

Table 1. Level of evidence for therapeutic studies

Level of evidence	Characteristic of studies
I	1. Randomized controlled trial
	a. Significant difference
	b. No signicant difference but condence interval
	2. Systematic review of Level I randomized controlled trials(studies were homogenous)
II	1. Prospective cohort study
	2. Poor quality randomized controlled trial
	3. Systematic review(results from two or more previous studies)
	a. Level II studies
	b. Nonhomogenous Level I studies
III	1. Case-control study
	2. Retrospective cohort study
	3. Systematic review of Level III studies
IV	Case series (non- or historical control groups)
V	Expert opinion

Types of interventions

Any form of correction and instrumented fusion in degenerative scoliosis defined in three groups, anterior correction alone (anterior correction anterior lumbar intervertebral body [ALIF] and instrumented fusion), combined anterior and posterior correction (anterior lumbar intervertebral body [ALIF] and posterior instrumented fusion), and posterior correction alone (posterolateral fusion combination with instrumented fusion, posterior lumbar intervertebral body [PLIF] fusion with instrumentation). Control group or non-corrective surgery defined as decompression with or without fusion (laminectomy, laminotomy, decompressive laminectomy, decompressive laminotomy, decompression and fusion, decompression and PL fusion, decompressive laminectomy and fusion, decompressive laminectomy and posterolateral fusion, decompression alone, or laminoplasty).

Types of outcome measures

Data on following outcome measures were obtained by independent reviewers for each trial[11].

Patient centered outcomes

Primary (essential) outcomes, Self-assessment Outcome (Oswestry Disability Index), validated pain scale: Visual analogue scale, numeral rating scale, verbal rating scale, Quality of life scale (SF-36), occupational outcomes, economic data.

Surgical outcomes

Secondary outcome, deformity correction, progression of the curve, fusion rate, fusion failure rate, rate of re-operation and cause, adjacent disc degeneration and objective clinical measures of physical improvement or impairment, including change in spinal motion, neurological evaluation, deformity, gait.

Complications, intra-operative and post-operative period (immediate, acute intermediate and long-term complication).

Quality assessment

The quality of studies was assessed according to Modified Oxford Scale (Table 2) for randomized controlled trial[12] and Methodological Index for Non-Randomized Studies (MINORS) (Table 3) for assessing the quality of non-randomized studies[13]. Two reviewers (AP, KW) scored the article separately. Any disagreement was resolved by discussion, followed, if necessary, by further discussion with the third reviewer (KJ).

Statistical analysis

Continuous data were analyzed as weight-mean difference with 95% confidence interval. Dichotomous data were calculated to relative risk with 95% confidence interval. Random effect model were used. Analyses were performed using Review Manager Software (version 5.0.15, Cochrane Collaboration).

The present study was approved by the institutional review boards of the Khon Kaen University ethics committee for human research.

Results

Literature search

The electronic database search was performed for the search terms "Degenerative AND/ OR Scoliosis". PubMed/MEDLINE produced 317 articles, Scopus produced 420 articles, EMBASE produced 413 articles, and CINAHL produced 17. After review, only 17 full-articles fit the criteria of the review, comprising 598 patients with degenerative lumbar scoliosis and treated by operative treatment and were included in the analysis. Four hundred fifty one patients were operated by correction procedure. All trials were non-randomized and non-comparative studies. There was no comparison between correction procedure and non-correction procedure, therefore, the quality assessment of studies were assessed by MINORS and the global ideal scoring being 16. Quality of studies, population, level of evidence and type of intervention are shown in Table 4.

Table 2. Modified Oxford scale

Category & score	Definition
Randomization	
0	None
1	Mentioned
2	Described & adequate
Concealment of allocation	
0	None
1	Yes
Double blinding	
0	None
1	Mentioned
2	Described & adequate
Flow of patients*	
0	None
1	Described but incomplete
2	Described & adequate

* Category refers to patients who withdrew or dropped out of the studies

Table 3. The revised of MINORS

Methodological items for non-randomized studies	Score*
1. A clearly stated aim: the question addressed should be precise and relevant in the light of available literature	
2. Inclusion of consecutive patients: all patients potentially t for inclusion (satisfying the criteria for inclusion) have been included in the study during the study period (no exclusion or details about the reasons for exclusion)	
3. Prospective collection of data: data were collected according to a protocol established before the beginning of the study	
4. Endpoints appropriate to the aim of the study: unambiguous explanation of the criteria used to evaluate the main outcome which should be in accordance with the question addressed by the study. Also, the endpoints should be assessed on an intention-to-treat basis.	
5. Unbiased assessment of the study endpoint: blind evaluation of objective endpoints and double-blind evaluation of subjective endpoints. Otherwise the reasons for not blinding should be stated	
6. Follow-up period appropriate to the aim of the study: the follow-up should be sufciently long to allow the assessment of the main endpoint and possible adverse events	
7. Loss to follow up less than 5%: all patients should be included in the follow up. Otherwise, the proportion lost to follow up should not exceed the proportion experiencing the major endpoint	
8. Prospective calculation of the study size: information of the size of detectable difference of interest with a calculation of 95% condence interval, according to the expected incidence of the outcome event, and information about the level for statistical signicance and estimates of power when comparing the outcomes Additional criteria in the case of comparative study	
9. An adequate control group: having a gold standard diagnostic test or therapeutic intervention recognized as the optimal intervention according to the available published data	
10. Contemporary groups: control and studied group should be managed during the same time period (no historical comparison)	
11. Baseline equivalence of groups: the groups should be similar regarding the criteria other than the studied endpoints. Absence of confounding factors that could bias the interpretation of the results	
12. Adequate statistical analyses: whether the statistics were in accordance with the type of study with calculation of condence intervals or relative risk	

* The items are scored 0 (not reported), 1 (reported but inadequate) or 2 (reported and adequate)
The global ideal score being 16 for non-comparative studies and 24 for comparative studies

Heterogeneity test was not performed due to considerable variety of methodology, surgical procedure, and outcome measurement between the studies. Meta-analysis of outcomes was not investigated; therefore, systematical review of included literature was done.

Patient centered outcomes

Self-assessment outcome

Five studies, all of which used Oswestry Disability Index, reported self-assessment outcome. Only one study, Glassman et al of non-corrective group, reported improvement of ODI by mean change from baseline $\pm$ SD 21.2 $\pm$ 20.5 at year 1 and 20.6 $\pm$ 19.8 at year 2 in 17 patients. Four studies of deformity correction group report ODI outcomes. Kluba et al reported the mean ODI was 42 (range 6 to 76%) in 19 patients after a mean follow up 4.8 years. Cho et al evaluated complications after decompression and posterolateral fusion with segmental pedicle screw instrumentation for degenerative lumbar scoliosis in 2007 and reported the improvement of the mean Oswestry Disability Index was less in patients with complication at the average follow-up period was 3.8 $\pm$ 1.7 years (range, 2-8.1 years). Preoperative ODI of 29 patients with no complication was 55.3 $\pm$ 16.8 and preoperative ODI of patients with complication after surgery was 62.3 $\pm$ 19.7. At final follow-up, ODI of patients with no complication was 35.5 $\pm$ 20.8 and ODI of patients with complication was 50.4 $\pm$ 28.1. Wu et al reported the outcomes of instrumented PLIF for degenerative lumbar scoliosis in 29 patients in 2008 after median follow-up period of 3 years (range, 2 to 6 y). The study stated average preoperative ODI score 25.8 comparing with 58.0 of postoperative ODI score. The reduction in mean ODI score was 55.5%. Of the 26 patients, 22 (84.6%) patients had more than 25% improvement in ODI scores. Cho et al compared the clinical and radiographic results of short fusion vs. long fusion by posterolateral fusion with autogenous

Table 4. Characteristics of include studies

Study	No. of Patients	Level of evidence	MINORS (16points)	Participants	Intervention
Aebi[14]	8	IV	3	Degenerative lumbar scoliosis	Decompression, correction and posterior instrumented lumbar fusion (corrective deformity study)
Marchesi et al[15]	27	IV	10	Adult lumbar scoliosis	Posterior segmental screw instrumentation (corrective deformity study)
Grubb et al [16]	24	IV	12	Degenerative scoliosis and stenosis	Posterior spinal fusion (non-corrective deformity study)
Frazier et al [17]	19	II	12	Degenerative scoliosis	Decompression and posterior instrumented lumbar fusion (non-corrective deformity study)
Zurbriggen et al[18]	40	IV	8	Lumbar stenosis	Decompression, correction and posterior instrumented lumbar fusion (corrective deformity study)
Narayan et al[19]	82	II	7	Patients underwent L-fusion with segmental pedicle screw fixation	Posterior instrumented fusion (non-corrective deformity study)
Aiki et al [20]	2	III	5	Patients underwent lumbar fusion surgery	Decompression Luque instrumentation and posterolateral fusion (non-corrective deformity study)
Kluba et al[21]	26	II	9	Degenerative lumbar scoliosis	Decompression, correction and posterior instrumented lumbar fusion (corrective deformity study)
Cho et al[7]	47	III	10	Degenerative lumbar scoliosis	Decompression, correction and posterior instrumented lumbar fusion (corrective deformity study)
Pateder et al[22]	155	III	8	Adult scoliosis	Comparison between posterior and combined Antero-posterior instrumented fusion (corrective deformity study)
Faldini et al[23]	12	IV	4	Degenerative spine condition	Decompression, correction and posterior instrumented lumbar fusion (corrective deformity study)
Glassman et al[24]	17	III	11	Patients underwent decompression and PL lumbar fusion	Decompression and posterior instrumented lumbar fusion (non-corrective deformity study)
Wu et al [25]	29	III	8	Degenerative lumbar scoliosis	Decompression, PLIF and posterolateral fusion (corrective deformity study)
Anand et al [26]	12	III	11	Degenerative lumbar scoliosis	Interbody fusion and percutaneous pedicle screw rod fixation (corrective deformity study)
Cho et al[27]	50	III	10	Degenerative lumbar scoliosis	Decompression, correction and posterior instrumented lumbar fusion (corrective deformity study)
Aoki et al[28]	2	IV	9	Degenerative scoliosis	Decompression, TLIF with a fusion cage and unilateral pedicle screw fixation (non-corrective deformity study)
Cho et al [29]	45	III	10	Degenerative lumbar scoliosis	Decompression, correction and fusion with posterior instrumentation (corrective deformity study)

iliac bone graft and segmental pedicle screw instrumentation for degenerative lumbar scoliosis in fifty patients at average follow-up period 4.3 ± 1.9 years (range 2-8.9 years) with a minimum 2 years follow-up in 2008. The Oswestry disability index improved from 65.3 preoperatively to 48.6 in the short fusion group, and in the long fusion group from 71.0 preoperatively to 47.8 with no statistical difference between groups.

Pain outcome

Six studies reported pain outcome. Four studies operated deformity correction. Marchesi et al reported 86% improvement at final result of corrective surgery by AO internal fixation or Cotrel-Dobousset instrumentation in 27 patients with mean follow-up time 56 months for IF group and 42.5 months for CD group. That study did not mention about type of pain scale measurement. Kluba et al reported only postoperative visual analogue scale 5.31 range from 1 to 10 at final follow-up in 16 patients. Faldini et al reported dramatic improvement of pain outcome in 12 patients from 7 (1) in preoperative status to 2 (1) at final follow-up. Anand et al studied 12 patients and reported improvement of pain outcome from 7.1 (2.8) in preoperative data to 4.8 (1.9) at final follow-up. In non-corrective operation group, Grubb et al reported postoperative pain ranged from 0-11, mean pain of with solid fusion of 2.7 and mean pain in patients with pseudarthroses of 5. Overall pain reduction was 70 % in 24 patients at 2 year follow-up. Glassman et al reported at 1 year follow-up 4.1 ± 2.8 and 3.2 ± 2.6 at 2 year follow-up.

Quality of life outcome

There were only three studies done, Aebi, 1988 and Zurbriggen et al, 1999 in correction group, and Glassman et al, 2009 in the non-correction group, which reported the Quality of life. Aebi's study reported seven of eight patients subjectively rated the overall outcome of correction surgery as good or excellent results. Zurbriggen et al reported results of 30 out of 40 patients who were operated on for correction surgery as 43.3% good outcome, 53.3% excellent outcome, and 33% satisfactory. Glassman et al reported health related quality of life by using SF-36 in 17 patients at 1 year 6.8 ± 9.6 and 2 year 6.6 ± 9.8 after correction surgery, and no mention about pre-operative scale.

None of the studies reported occupational outcomes or cost-effectiveness data.

Surgical outcomes

Deformity correction and progression

No information about deformity progression was reported in all non-corrective studies. All studies of corrective procedure reported improvement of deformity from immediate postoperative radiograph to final follow up. Marchesi et al reported 62% Cobb angle improvement from mean 42 degree (range, 22-82 degree) pre-operative deformity. Zurbriggen et al reported 40.65% improvement from mean preoperative deformity of 18.7 degree. Kluba et al reported mean preoperative deformity of 25 degree and mean 17.1 degree (range, 6-76) at final follow-up. Faldini et al reported 64% improvement from 18 ± 4 degree of preoperative deformity to 8 ± 4 degree at the end of the study. Wu et al reported 55.2% improvement from 16.5 degree of preoperative deformity to 7.4 degree at final follow-up. Anand et al reported mean 18.93 ± 10.48 degree of preoperative deformity and 6.19 ± 7.2 degree at last follow-up. In 2007, Cho et al reported mean 18.6 ± 6.1 of pre-operative Cobb angle and 9.42 ± 5.8 at final follow-up. In 2008, Cho et al reported mean pre-operative deformity of short fusion group was 16.3 degree, and long fusion group was 21.7 degree. At final follow-up in the same study, deformity was improved to 10.1 degree in short fusion group and 6.1 degree in long fusion group. In 2009, Cho et al reported mean preoperative deformity of fusion to L5 group was 24.7 ± 11.6 degree, and fusion to S1 group was 22.8 ± 7.5 degree. At final follow-up, deformity was improved to 6.8 ± 6.5 degree in fusion to L5 group and 7.7 ± 5.9 degree in fusion to S1 group.

Fusion rate

Three studies in the non-correction group reported fusion rate. Grubb et al reported fusion 82.5%. Narayan and associates reported 57 fusions of 82 patients (70%). Finally, Aoki reported 100% fusion (2 patients). Correction group, Aebi reported all eight patients fused. Marchesi et al reported 96% fusion rate. Zurbriggen et al reported final 80% fusion. In 2007, Cho et al reported 95% fusion. Faldini et al reported 100% of 12 patients fused. Finally, in 2009, Cho et al reported 97% fusion.

Re-operation

Three studies reported re-operation rate. Glassman et al reported two from 17 patients were re-operated. Aiki et al reported 100% re-operation (2 patients) but Aoki et al reported no re-operation. There were eight studies reporting re-operation in

corrective procedure. No re-operation was reported by Aebi studies and Faldini et al studies. Marchesi et al reported two out of 27 patients (7.4%). Zurbriggen et al reported 50% of re-operation rate. Kluba et al reported 23% of re-operation rate. In 2007, Cho et al reported seven out of 47 patients (14.89%) were re-operated. In 2008, Cho et al reported re-operation in seven out of 50 patients. Finally, in 2009, Cho et al reported re-operation in nine out of 45 patients.

Adjacent segment degeneration and disease

Two studies reported adjacent segment degeneration and/or disease. Aoki et al reported no adjacent segment syndrome but Aiki et al reported 100% of adjacent segment degeneration. Six studies reported adjacent segment degeneration of disease. Marchesi et al reported one patient had adjacent disc degeneration at distal level from 27 patients. Zurbriggen et al reported proximal level adjacent segment degeneration in 30 out of 40 patients. In 2007, Cho et al reported 10 patients had proximal adjacent disc degenerations and five patients had distal adjacent disc degenerations out of 47 patients. Wu et al reported five proximal adjacent disc degeneration out of 29 patients. In 2008, Cho et al reported 12 patients had proximal adjacent disc degeneration and three patients had distal adjacent disc degeneration out of 50 patients. Finally, in 2009, Cho el al reported 14 distal adjacent degeneration out of 45 patients.

Complications

Eleven studies reported a complication rate. Two studies of non-correction group, Aoki et al and Glassman et al, reported a complication rate 100% and 41% respectively. The correction group included nine studies. Aebi et al reported two out of 8 patients (25%), one flat back syndrome, and one implant failure. Marchesi et al reported three out of 27 patients (11%). Zurbriggen et al reported 18 out of 40 patients (45%). Cho et al, in 2007 reported early perioperative complication 14 patients (29.7%) and late complication 18 patients (38.3) out of 47 patients; in 2008 reported 15 complications in 28 patients (53.6%) in the short fusion group, and 18 complications in 22 patients (81.8%) in the long fusion group; and in 2009 compared the results of distal fusion to L5 versus the sacrum in the long instrumentation and fusion and reported complication in four out of 24 patients (16.7%) of L5 group and five out of 21 patients (23.8%) of S1 group. Faldini et al reported one dura tear in 12 patients. Wu et al reported three out of 29 patients (10%). Anand et al assessed minimally invasive lumbar interbody fusion without decompression by posterior multilevel percutaneous pedicle instrumentation and reported no complication at mean follow-up 75.5 ± 7.1 day (range, 15-150 days).

Discussion

Overall, surgical results of comparison between correction and non-corrective operation were comparable. In non-corrective operation, there were only six studies including 147 patients compared with corrective operation, which included 451 patients.

The methodological quality of the trials was almost low. Neither comparative studies nor randomized controlled studies were identified. Only five of seventeen studies were performed by prospective data collection[14,19,21,24,26]. Because of non-comparative and non-randomized study design of all studies, Methodological items for non-randomized studies (MINORs) were used for evaluating quality of the study. Most of the studies lack score of unbiased assessment or blinding and prospective calculation of sample size items. The present found that all studies were only categorized in grade II or below according to level of evidence[8,9]. Few studies reported patient centered outcomes, for instance, Oswestry Disability Index, well quality pain scale or Quality of life scale.

There were previously several systematic reviews about treatment of degenerative scoliosis but all of those did not evaluate according to systematic review process. The authors performed systematic review of the literature by a strict methodology of systematic review process for trying to solve specific clinical question and determine treatment recommendation about corrective deformity operation of degenerative lumbar scoliosis. Because there is insufficient well quality research, especially randomized controlled trial or even comparative study, and comparable in surgical outcomes of risk and benefit between correction and non-corrective surgery, the authors classified Level 2C or very weak recommendation according to Recommendation grade[30] (Table 5) for corrective procedure in degenerative lumbar scoliosis.

For the limitation of the study, the systematic review was performed by searching English publication, which might be affected by language bias. Ideally, systematic review would be included in all studies regardless of language of publication. Although it created language bias, one literature[31] proposed that it does not appear to bias the effect size. Second, none of the research of degenerative scoliosis was

Table 5. Recommendation grade[30]

Grade of recommendation	Clarity of risk/benefit	Methodologic strength of supporting evidence	Implications
1A	Clear	Randomized trials without important limitations	Strong recommendation; can apply to most patients in most circumstances without reservation
1B	Clear	Randomized trials with important limitations (inconsistent results, methodologic flaws)	Strong recommendations; likely to apply to mostpatients
1C+	Clear	No RCTs* but RCT results can be unequivocally extrapolated, or overwhelming evidence from observation studies	Strong recommendation; can apply to most patients in most circumstances
1C	Clear	Observation studies	Intermediate-strength recommendation; may change with stronger evidence available
2A	Unclear	Randomized trials without important limitations	Intermediate-strength recommendation; best action may differ depending on circumstances or patients' or societal values
2B	Unclear	Randomized trials with important limitations (inconsistent results, methodologic flaws)	Weak recommendation; alternative approacheslikely to be better for some patients under somecircumstances
2C	Unclear	Observation studies	Very weak recommendations; other alternatives may be equally reasonable

* RCT indicates randomized controlled trial

performed by comparative study between correction and non-correction surgery. The third limitation of the authors' systemic review was completely different in the type of surgical procedure between studies. The authors did not perform subgroup analysis of different surgical options due to few patients and studies, especially non-corrective studies and anterior lumbar surgery. There is a need for more scientific evidence on the clinical results of surgical treatment in the aspect of corrective deformity procedure for degenerative lumbar scoliosis. This problem will require high quality randomized controlled clinical trials and well outcome measurement to compare between correction and non-corrective surgery.

Conclusion

After using a systematic review process and rigid criteria for analysis, there was insufficient good-quality comparative studies for surgical treatment outcome comparing between corrective deformity and non-corrective procedure. The correction of deformity in degenerative lumbar scoliosis was classified as Level 2C (very weak recommendations). This questionable issue requires further high quality randomized controlled clinical trials and outcome measurement.

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การศึกษาสืบค้นทบทวนวรรณกรรมงานวิจัยอย่างเป็นระบบ ของผลการรักษาการผ่าตัดแก้ไขความผิดรูปกระดูกสันหลัง โดยการใส่โลหะดามกระดูกสันหลัง และเชื่อมหลังเปรียบเทียบกับการผ่าตัดโดยไม่แก้ความผิดรูปในผู้ป่วยกระดูกสันหลังส่วนเอวคดจากความเสื่อม

อาคม พรมมหาไชย, เกรียงไกร วิทยาไพโรจน์, กิตติ จิระรัตน์โพธิ์ชัย, สุรชัย แซ่จึง

วัตถุประสงค์: *เพื่อศึกษาผลการรักษาโรคกระดูกสันหลังส่วนเอวคดจากความเสื่อมโดยการผ่าตัดเปรียบเทียบระหว่างการผ่าตัดแก้ไขความผิดรูปกระดูกสันหลังโดยการใส่โลหะดามกระดูกสันหลังและเชื่อมหลัง กับการผ่าตัดโดยไม่แก้ความผิดรูปโดยใช้รูปแบบการทบทวนวรรณกรรมอย่างมีระบบ*

วัสดุและวิธีการ: *กลยุทธ์การสืบค้น: ทำการสืบค้นจากฐานข้อมูลงานวิจัยทางการแพทย์จาก Pubmed (จาก วันที่ 1 มกราคม พ.ศ. 2503 ถึง 31 มีนาคม พ.ศ. 2552), EMBASE (จากวันที่ 1 มกราคม พ.ศ. 2528 ถึง 31 มีนาคม พ.ศ. 2552), The Cochrane Central Register of Controlled Trials, CINAHL, Scopus รวมถึงงานวิจัยอ้างอิงของการศึกษานั้น Grey literature จะสืบค้นจากฐานข้อมูล Scirus คุณภาพของแต่ละการศึกษาประเมินโดยใช้เครื่องมือ MINORS และทำการวิเคราะห์หา treatment recommendation, เกณฑ์การเลือก: เลือกเฉพาะการศึกษาที่มีระดับ 1 ถึง 4 เข้าร่วมในการวิเคราะห์ผลการรักษาโดยการผ่าตัดในผู้ป่วยกระดูกสันหลังส่วนเอวคดจากความเสื่อม, การรวบรวมข้อมูล: มีผู้รวบรวมการศึกษา ประเมินคุณภาพงานวิจัย และคัดกรองข้อมูลสองคน โดยข้อมูลผลงานวิจัยที่นำมาวิเคราะห์ประกอบด้วย patient centered outcomes, surgical outcome และภาวะแทรกซ้อนจากการผ่าตัด*

ผลการศึกษา: *รวบรวมการศึกษามีเกี่ยวข้องทั้งหมด 17 การศึกษา รวมผู้ป่วย 598 ราย ที่มีกระดูกสันหลังส่วนเอวคดจากความเสื่อม มีผู้ได้รับการรักษาโดยการผ่าตัดแก้ไขความผิดรูปกระดูกสันหลังรวม 451 ราย ทุกการศึกษาไม่ใช่การศึกษาแบบเปรียบเทียบ และไม่มีการสุ่มประชากรของการศึกษา การศึกษาส่วนใหญ่เป็นระดับ III ถึง IV ตาม level of evidence ผลการรักษาโดยรวมระหว่างการผ่าตัดแก้ไขความผิดรูปกระดูกสันหลังโดยการใส่โลหะดามกระดูกสันหลังและเชื่อมหลัง เมื่อเปรียบเทียบกับการผ่าตัดโดยไม่แก้ความผิดรูป ให้ผลการรักษาใกล้เคียงกัน*

สรุป: *จากการทบทวนวรรณกรรมการวิจัยอย่างเป็นระบบ ณ ปัจจุบันยังไม่มีการศึกษาเปรียบเทียบผลการรักษาระหว่างการผ่าตัดแก้ไขความผิดรูปกระดูกสันหลัง โดยการใส่โลหะดามกระดูกสันหลังและเชื่อมหลังเปรียบเทียบกับการผ่าตัดโดยไม่แก้ความผิดรูป ที่มีคุณภาพดีเพียงพอ ดังนั้นการผ่าตัดแก้ไขความผิดรูปกระดูกสันหลังในผู้ป่วยกระดูกสันหลังส่วนเอวคดจากความเสื่อมจึงถูกจัดอยู่ในระดับ 2C (very weak recommendation)*