Review Article
Comparison of conservative and operative treatment for distal radius fracture: a meta-analysis of randomized controlled trials

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Abstract: Background: The authors conducted a meta-analysis to compare the effectiveness and safety of conservative and operative treatment for distal radius fracture. Methods: PubMed, EMBASE, and the Cochrane Library were searched to identify the relevant studies published up to February of 2015. All randomized controlled trials published to compare the conservative and operative treatment were included in the study. Results were pooled using meta-analysis to compare the efficacy and safety of conservative and operative treatment for distal radius fracture. Results: The databases were derived from seven qualified studies that included a total of 523 patients in which 269 cases adopted conservative treatment while 253 cases adopted operative treatment. Overall, compared with the conservative treatment- treated the distal radius fracture, operative therapies resulted in significantly better radiographic (P<0.05), however, no significant differences of the functional outcomes and complication rate were observed between the two methods (P>0.05). Conclusion: Surgical treatment seems to be more effective distal radius fracture compared with conservative treatment when the radiographic outcomes were analyzed, and no significant differences were deteched in the functional outcomes and complication rate.

Keywords: Distal radius fracture, conservative treatment, operative treatment, randomized controlled trials

Introduction

Distal radius fracture is one of the most frequent fracture human injuries in elderly patients, which represents about 17% of all the skeletal fractures [1, 2]. Debates exist whether this kind of fracture should be treated by conservative or operative method. With the rapid expansion of knowledge regarding the functional anatomy of hand and wrist, more precise manners are acquired to address the fractures, which include: closed reduction and casting, closed reduction and percutaneous pinning, closed reduction and external fixation, open reduction and internal fixation, which are favored by many orthopaedic surgeons.

The choice of the treatment depends on many factors such the patients' age, life style, type of the facture, severity and alignment of the fracture, condition of the soft tissues. Treatment by closed reduction and casting immobilization can be adopted at low direct cost without admission to hospital, however, which permits no anatomical reconstruction of the bone frag-

ments and joint cartilage. Such reconstruction can be regarded as necessary, albeit insufficient, especially for the displaced, unstable fracture, which requires anatomic restoration of the bone fragments. Operative management is associated with typical surgical risk factors, exposure to radiation, and financial expense. Nevertheless, it was also reported that very good clinical outcomes had been documented in elderly patients suffering from unstable fracture who were treated without operation, even if the fracture was allowed to heal with mal-alignment of the distal end of the radius [3]. It has been demonstrated that mal-alignment does not correlate with the functional outcomes in elderly patients [4].

A previous systematic review of 21 studies with 2093 patients reported that the available data suggest that in patients over 60 the function outcomes of nonoperative treatment, despite the poorer radiological results, does not differ from that of surgical management [5]. However, this was a descriptive systematic review without more rigorous meta-analysis. Thus, a meta-

Table 1. Characteristics of the eight studies included in the meta-analysis

Study	Country	Mean age (years) C/O	No. of Patients C/O	Study design	AO classification (A, B, C) C/O	Flow-up (months) C/O
HOWARD 1989 [7]	UK	49.2/45.3	25/25	RCT	Not mentioned	6
Azzopardi 2005 [8]	UK	71/ 72	27/30	RCT	Not mentioned	12
WONG 2010 [9]	China	71/70	30/30	RCT	Not mentioned	19.5
Arora 2011 [10]	Austria	77.4/75.9	37/36	RCT	12, 0, 25/10, 0, 26	12
Sharma 2014 [11]	India	48.1/52.39	32/32	RCT	0, 13, 19/0, 15, 17	24
Gauresh 2014 [12]	India	Not mentioned	30/15	RCT	Not mentioned	13.5
Bartl 2014 [13]	Germany	74.4/75.3	88/86	RCT	0, 0, 86/0, 0, 88	12

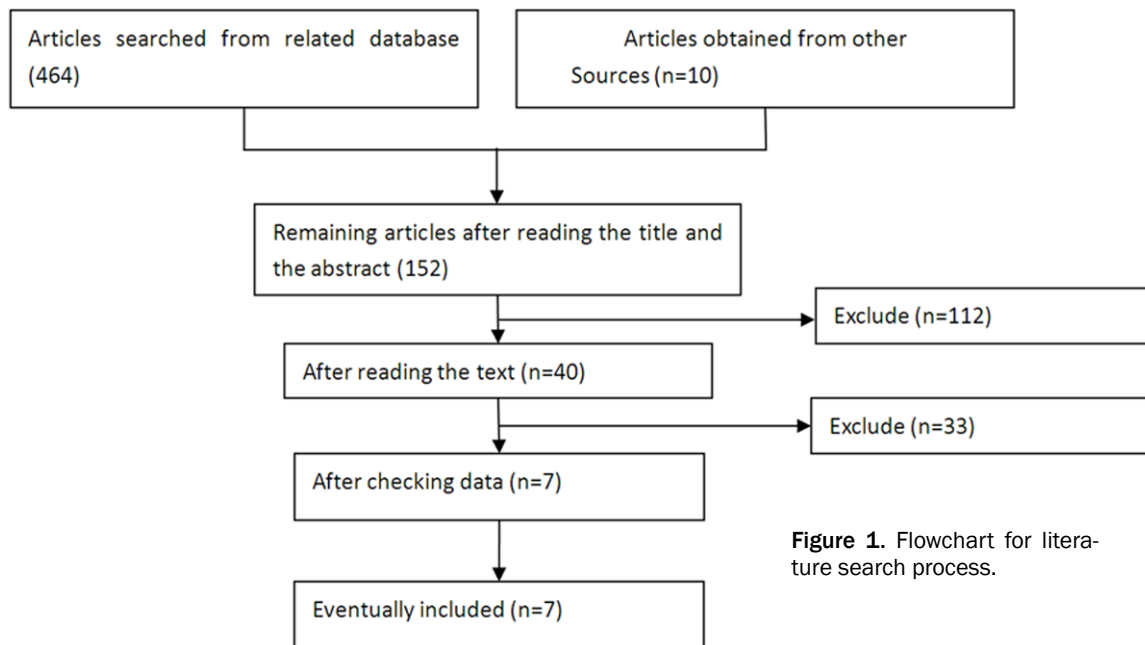C=conservative treatment; O=operative Treatment.

Figure 1. Flowchart for literature search process.

analysis which adopts the standards of the international Cochrane Collaboration is urgently required to assess the efficacy and safety of conservative treatment versus operative treatments for the elderly patients suffering from distal radius fractures. Therefore, the meta-analysis was carried out to compare the effectiveness and safety of conservative and operative therapy for the distal radius fractures and help those patients in choosing the suitable treatment for them.

Patients and methods

Search strategy

A literature search was carried out using the PubMed, EMBASE, and Cochrane Library databases from their inceptions to January of 2015 to identify relevant studies reporting conserva-

tive and operative treatment for distal radius fracture. In addition, the references of relevant articles and proceedings were examined for additional relevant references. The used search terms were "conservative treatment", "operative treatment", "prospective random controlled trails", "distal radius fractures". The inclusion and exclusion criteria are presented below.

Selection criteria

The included studies had to meet the following criteria: (1) randomized controlled trials comparing conservative therapy and operative therapy for human in English; (2) patients suffering from distal radius fractures; (3) the ages of the included patients are no less than 45 years old; (4) no others therapies were adopted for the enrolled patients before conservative or opera-

Table 2. Quality assessment of the included studies

Study	Random sequence generation	Allocation concealment	Blind Participants and personnel/ outcome assessment	Incomplete Outcome data	Selective reporting	Other bias
HOWARD 1989 [7]	Unclear	Unclear	Low/Low	Low	High	Unclear
Azzopardi 2005 [8]	Low	Unclear	Low/Low	Low	High	Unclear
WONG 2010 [9]	Unclear	Unclear	Low/Low	High	Low	Unclear
Arora 2011 [10]	Low	Unclear	Low/Low	High	Low	Unclear
Sharma 2014 [11]	High	Unclear	Low/Low	Low	Low	Unclear
Gauresh 2014 [12]	Unclear	Unclear	Low/Low	Low	High	Unclear
Bartl 2014 [13]	Unclear	Unclear	Low/Low	High	Low	Unclear

Table 3. Overall estimations and subgroup analyses of meta-analysis

Results	No. studies	No. patients C	No. patients O	MD or RR (95% CI) (3, 6, 12 months)	P value	Heterogeneity
Radial inclination	4 [8, 9, 11, 13]	227	223	-3.49 [-4.87, -2.17] -4.00 [-5.01, -2.99] -3.20 [-4.25, -2.14]	<0.01	I^2=65%
Palmar inclination	3 [8, 9, 13]	199	193	-7.04 [-7.54, -6.54] -7.00 [-7.51, -6.49] -7.00 [-7.50,-6.50]	<0.01	I^2=0%
Ulnar variance	3 [8-10]	154	156	1.10 [0.46, 1.74] 1.10 [0.46, 1.74] 0.60 [0.15, 1.04]	<0.01	I^2=44%
Radial deviation	2 [10, 11]	173	170	0.00 [-3.21, 3.21] 1.00 [-3.49, 5.49] -4.16 [-16.15, 7.84]	0.53	I^2=96%
Ulnar deviation	3 [9-11]	175	172	-2.00 [-6.59, 2.59] -3.00 [-7.36, 1.36] -4.73 [-15.98, 6.53]	0.30	I^2=96%
Palmar flexion	4 [9-11, 13]	336	309	5.55 [-1.50, 12.61] -3.00 [-8.31, 2.31] -1.19 [-9.14, 6.76]	0.88	I^2=90%
Dorsal extension	4 [9-11, 13]	336	309	3.86 [-1.32, 9.03] 0.00 [-5.28, 5.28] -3.08 [-8.05, 1.89]	0.70	I^2=85%
DASH scores	3 [10, 11, 13]	306	281	7.03 [2.33, 11.74] 0.20 [-7.02, 7.42] 2.22 [-0.71, 5.16]	<0.01	I^2=0%
Grip strength	2 [9, 10]	141	138	-3.20 [-5.67, -0.73] -3.70 [-6.72, -0.68] -1.84 [-3.99, 0.31]	<0.01	I^2=0%
Complication rate	5 [7-10, 12, 13]	239	220	1.05 [0.15, 7.23] 1.28 [0.48, 3.48] 3.33 [1.04, 10.69]	0.26	I^2=67%

C=conservative treatment; O=operative Treatment.

tive treatment; (5) full-text articles reporting the effectiveness and/or safety. The effectiveness of radiographic outcomes includes ulnar variance, radial inclination, palmar inclination, while the effectiveness of functional outcomes includes ulnar deviation, radius deviation, flexion, extension, grip strength, Disabilities of the Arm, Shoulder and Hand (DASH) scores; safety profile included complication related to the therapy such as median neuropathy, surgical site infection, complex regional pain syndrome, distal radial ulnar joint problems, delayed union, carpal instability. Articles without a clear description of data regarding intervention de-

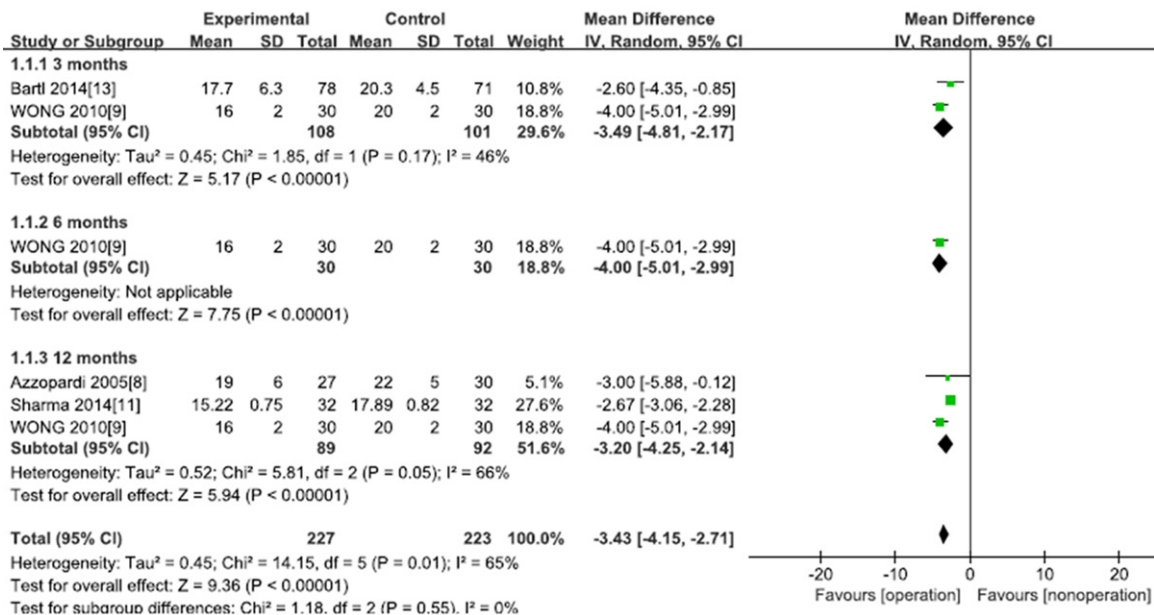| Study or Subgroup	Experimental			Control			Weight	Mean Difference IV, Random, 95% CI
	Mean	SD	Total	Mean	SD	Total		
1.1.1 3 months								
Bartl 2014[13]	17.7	6.3	78	20.3	4.5	71	10.8%	-2.60 [-4.35, -0.85]
WONG 2010[9]	16	2	30	20	2	30	18.8%	-4.00 [-5.01, -2.99]
Subtotal (95% CI)			108			101	29.6%	-3.49 [-4.81, -2.17]
Heterogeneity: Tau² = 0.45; Chi² = 1.85, df = 1 (P = 0.17); I² = 46%								
Test for overall effect: Z = 5.17 (P < 0.00001)								
1.1.2 6 months								
WONG 2010[9]	16	2	30	20	2	30	18.8%	-4.00 [-5.01, -2.99]
Subtotal (95% CI)			30			30	18.8%	-4.00 [-5.01, -2.99]
Heterogeneity: Not applicable								
Test for overall effect: Z = 7.75 (P < 0.00001)								
1.1.3 12 months								
Azzopardi 2005[8]	19	6	27	22	5	30	5.1%	-3.00 [-5.88, -0.12]
Sharma 2014[11]	15.22	0.75	32	17.89	0.82	32	27.6%	-2.67 [-3.06, -2.28]
WONG 2010[9]	16	2	30	20	2	30	18.8%	-4.00 [-5.01, -2.99]
Subtotal (95% CI)			89			92	51.6%	-3.20 [-4.25, -2.14]
Heterogeneity: Tau² = 0.52; Chi² = 5.81, df = 2 (P = 0.05); I² = 66%								
Test for overall effect: Z = 5.94 (P < 0.00001)								
Total (95% CI)			227			223	100.0%	-3.43 [-4.15, -2.71]
Heterogeneity: Tau² = 0.45; Chi² = 14.15, df = 5 (P = 0.01); I² = 65%								
Test for overall effect: Z = 9.36 (P < 0.00001)								
Test for subgroup differences: Chi² = 1.18, df = 2 (P = 0.55), I² = 0%								

Figure 2. Forest plot of radial inclination for conservative and operative treatment.

tails, effectiveness, or safety were excluded. In addition, those articles that did not report the outcomes of interest or that lacked sufficient data to assess the outcomes were also excluded. Two investigators independently retrieved and reviewed all identified citations to confirm inclusion or exclusion of studies.

Data extraction and quality assessment

The primary radiographic outcomes include ulnar variance, radius inclination, palmar inclination while the second functional outcomes includes ulnar deviation, radius deviation, flexion, extension, grip strength, DASH score, the last safety profile includes complication related to the therapy such as median neuropathy, surgical site infection, complex regional pain syndrome, distal radial ulnar joint problems, delayed union, carpal instability. The following information was independently extracted from the included studies using a standardized collection form by two investigators: author, publication year, country of the included study, mean age of the included patients, included article type, following-up and AO classification (**Table 1**). Quality evaluations of the enrolled RCTs were carried out by two independent authors using the Cochrane Risk of Bias tool, which includes random sequence generation, allocation concealment, blinding, incomplete outcome data, selective reporting and other sources of bias [6]. Any conflicts regarding literature

search, study selection, and data extraction between the two investigators were resolved through discussions and consensus with the senior author.

Data synthesis and analysis

Statistical analysis was performed by using RevMan 5.2 software. All analyses were conducted by using two-sided tests, with a significance level of *P*<0.05. Heterogeneity was tested by the I² statistic, with values less than 50 percent being considered to represent no significant heterogeneity. In cases of no heterogeneity, the fixed effects model was used. When heterogeneity was present, possible sources of heterogeneity were explored and the random effects model was used. For dichotomous variables, the relative risk and 95 percent confidence intervals were calculated. For those data involving quantitative measurement, a mean difference and 95 percent confidence intervals were calculated.

Each outcome index was subjected to intention-to-treat analysis. The potential presence of publication bias was examined for using the funnel plot produced by RevMan 5.2 software. Sensitivity analyses were conducted to estimate the strength of outcomes and to explore the influence of the trial design and methods on the effect size, by which the meta-analysis estimates are computed by omitting the lowest quality study.
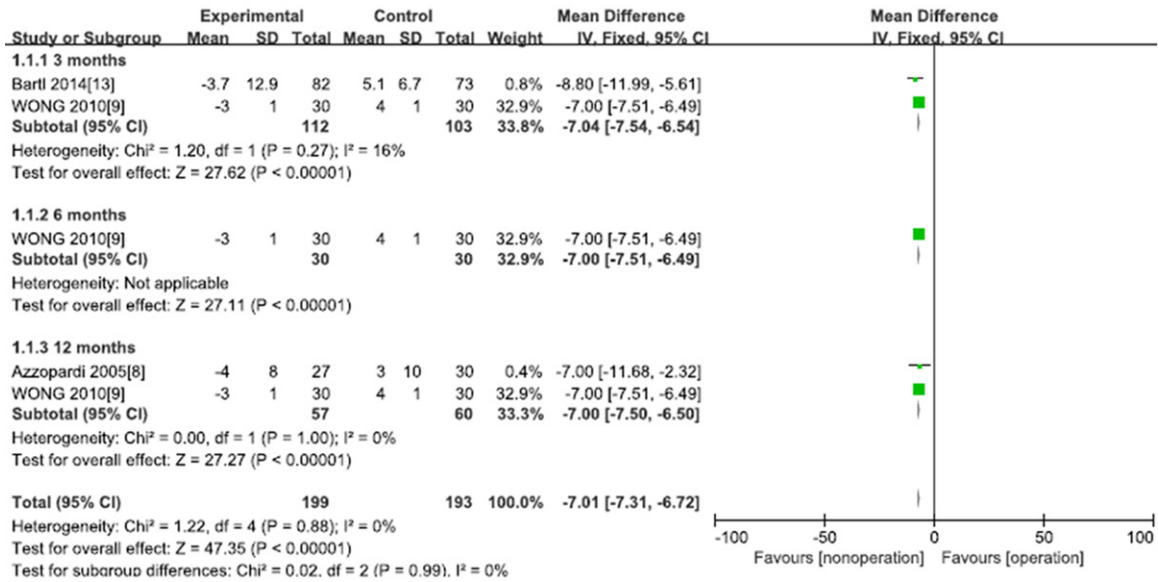
Figure 3. Forest plot of palmar inclination for conservative and operative treatment.
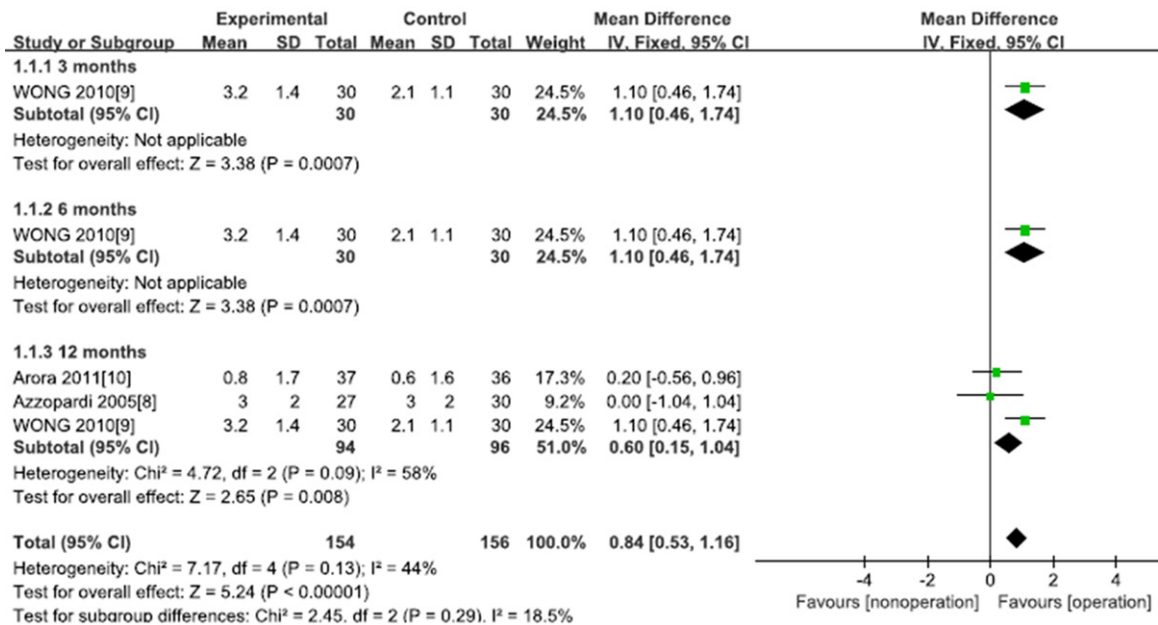

Figure 4. Forest plot of ulnar variance for conservative and operative treatment.

Results

Literature search and evaluation

A flowchart of the literature screening process is shown in **Figure 1**. A total of 474 articles were initially identified, including 350 retrieved electronically and 124 retrieved manually after the elimination of duplicates, reviews, letters, and articles with irrelevant purposes or designs. 152 therapeutic clinical trials remained after

reading the title and the abstracts. Of these left trials, 112 articles were excluded after reading the content of the articles. 33 included articles were excluded after careful rechecking the data. Finally, seven randomized controlled trials met all inclusion and exclusion criteria published from 1989 to 2011 [7-13] (**Figure 1**).

The enrolled seven articles involved 523 patients suffering from distal radius fracture, in which 269 patients adopted conservative treat-
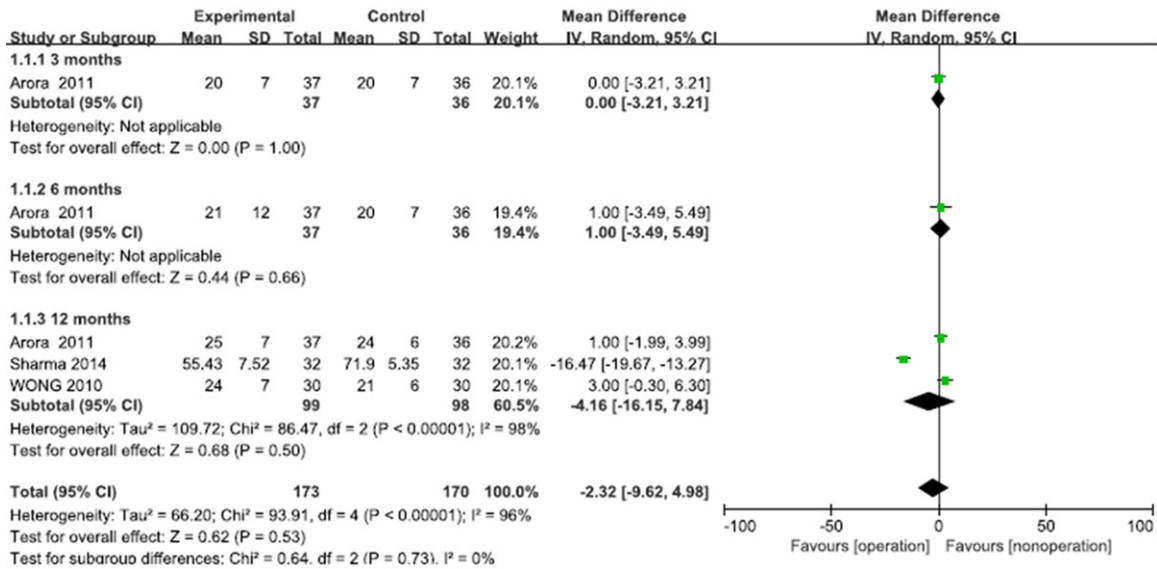
Figure 5. Forest plot of radial deviation for conservative and operative treatment.
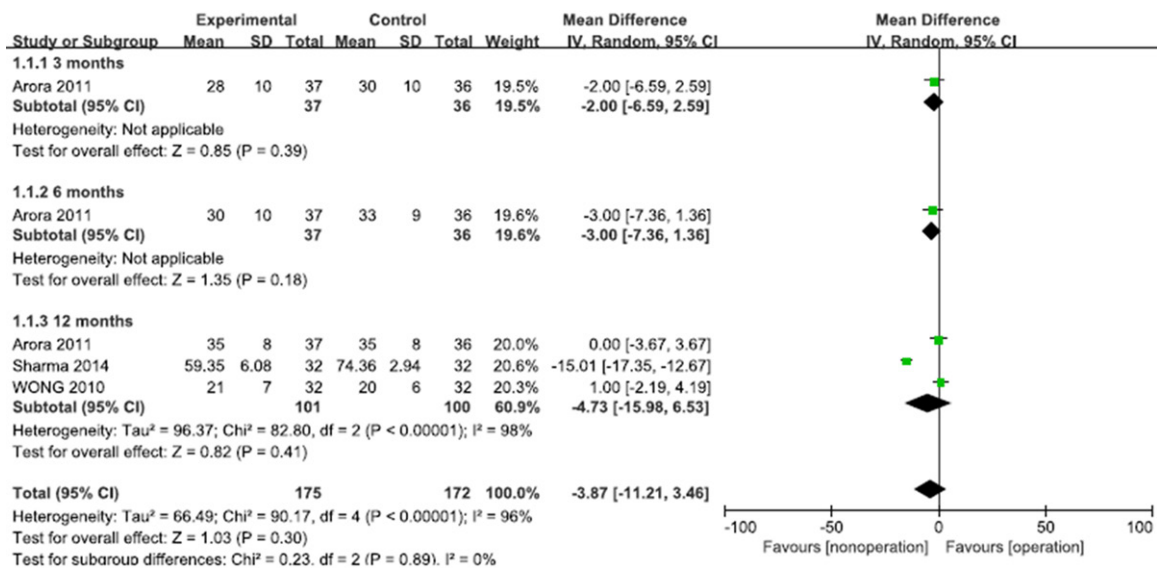
Figure 6. Forest plot of ulnar deviation for conservative and operative treatment.

ment while 254 patients adopted operative treatment. Distal radius fractures of the patients in three included studies [10, 11, 13] were characterized using the AO classification [14]. The clinical characteristics of the studies are presented in **Table 1.**

The investigators of two articles [8, 10] describe random components in the sequence generation process, while one article [11] describes a non-random component in the sequence generation process, the others articles [7, 9, 12,

13] provided insufficient information about the sequence generation process. The methods of concealment are not described or not described in sufficient details to allow definite judgment for all the included studies [7-13]. It was believed that outcomes and measurements of included studies [7-13] were not likely to be influenced by lack of blinding, and the risks of performance and detection bias did not exist. Three studies [9, 10, 13] provided incomplete outcome data. Another three studies [7, 8, 12] failed to include key outcomes that would be
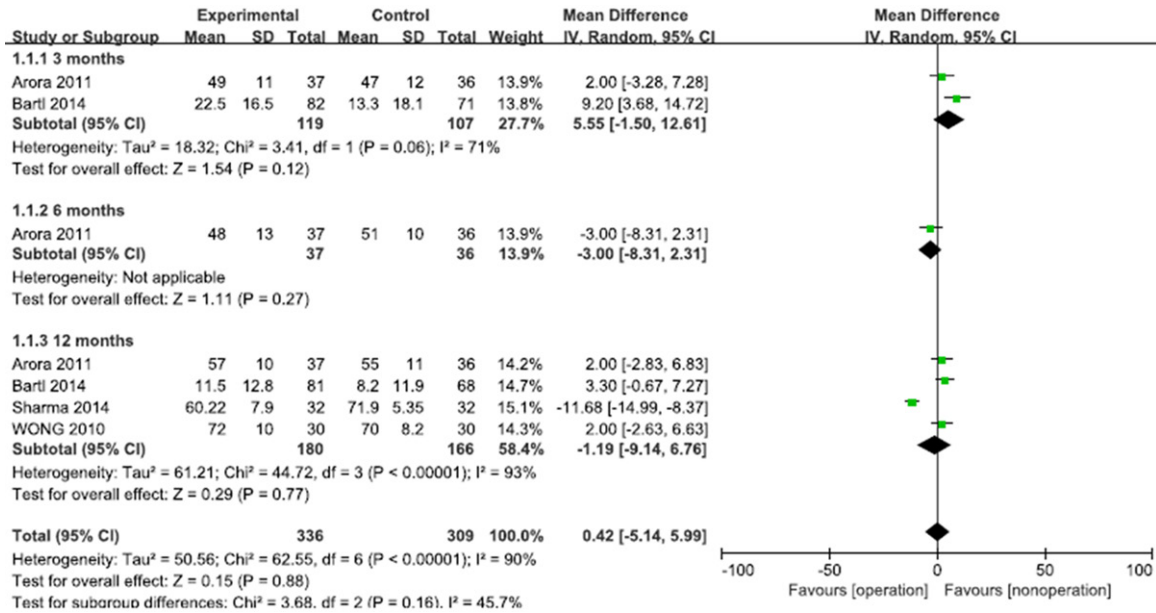
Figure 7. Forest plot of palmar flexion for conservative and operative treatment.
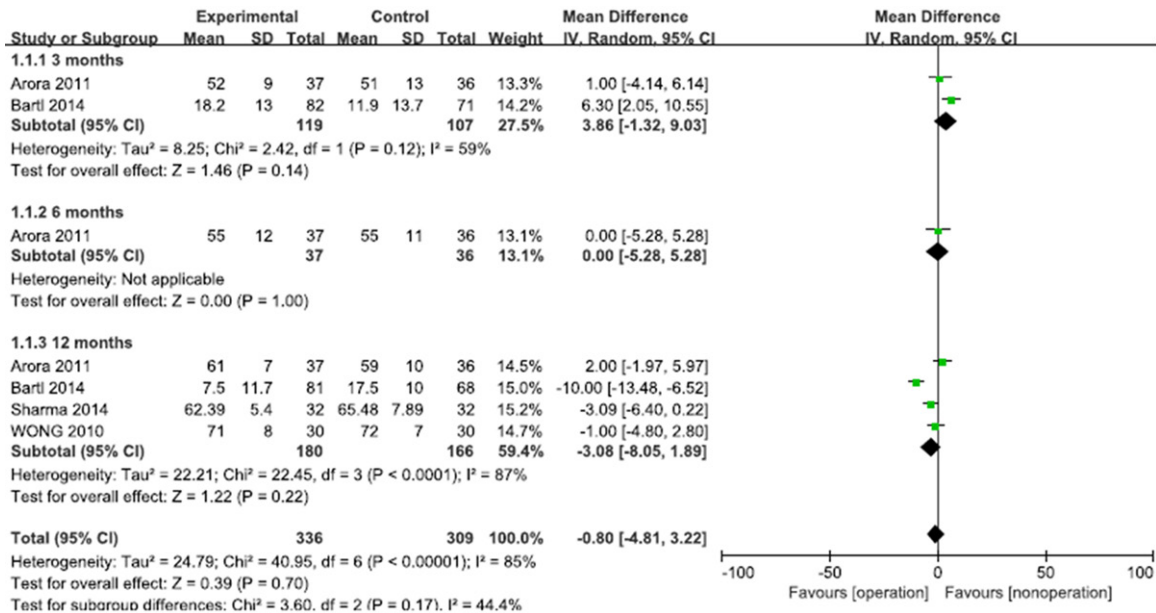

Figure 8. Forest plot of dorsal extension for conservative and operative treatment.

expected to have been reported for such studies. All the included studies [7-13] could not provide sufficient information to assess whether an important risk of bias exists (**Table 2**).

Radiographic outcomes

Three representative radiographic results, including radial inclination, ulnar variance, palmar inclination were chosen to evaluate the

radiographic outcomes at 3 months, 6 months, 12 months (**Table 3**).

Random effects model for meta-analysiswas used because significant heterogeneity (I^2= 65%) between the included trials [8, 9, 11, 13] were detached as the result of radial inclination was evaluated. The conservative treatment has significantly smaller radial inclination when compared with that of operative treatment at 3
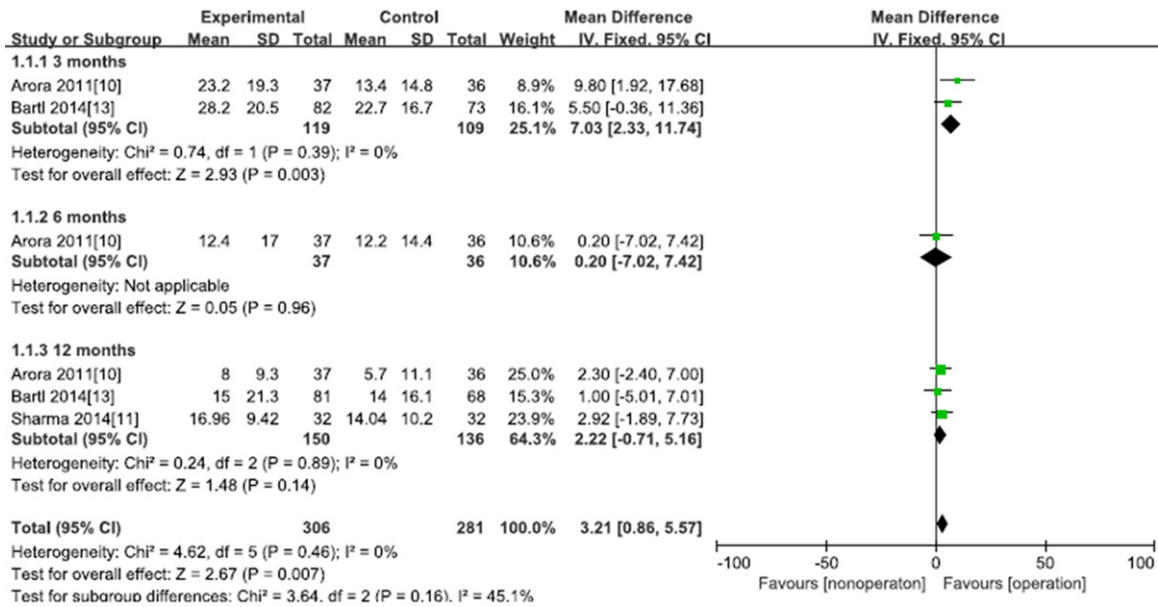
Figure 9. Forest plot of DASH scores for conservative and operative treatment.
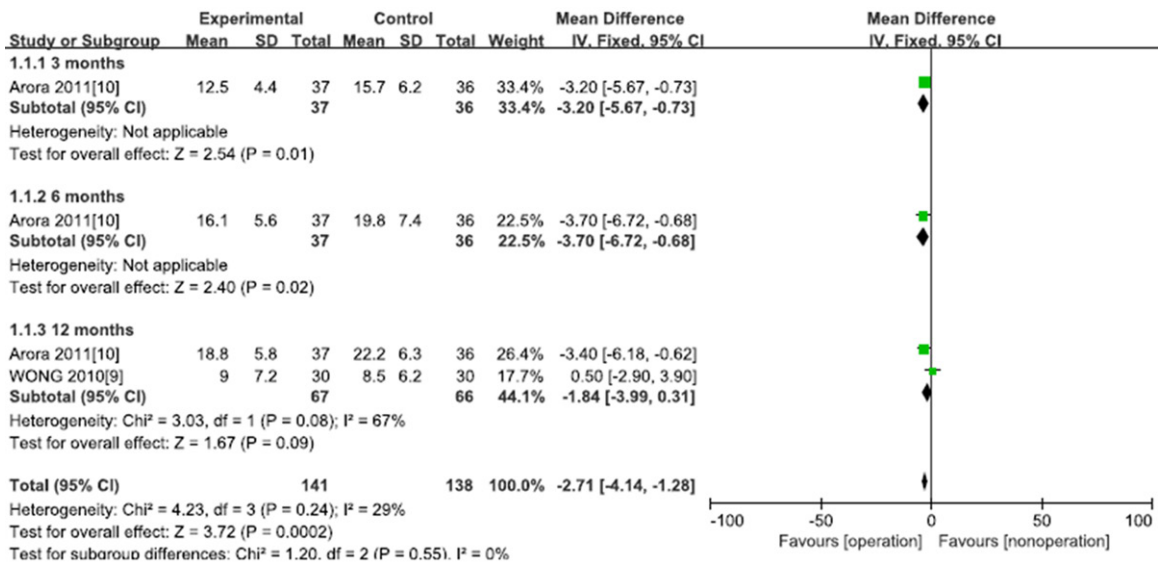

Figure 10. Forest plot of grip strength for conservative and operative treatment.

months, 6 months and 9 months (mean difference, -3.36; 95% CI, -4.81 to -2.17; $P<0.001$), (mean difference, -4.00; 95% CI, -5.01 to -2.99; $P<0.001$), (mean difference, -3.20; 95% CI, -4.25 to -2.14; $P<0.001$) (**Figure 2**).

Fixed effects model for the meta-analysis was adopted as nonheterogeneity ($I^2=0\%$) was found among the enrolled three studies [8, 9, 13] when the result of palmar inclination was evaluated. It is shown that conservative thera-

py has significantly smaller palmar (or larger dorsal) inclination when compared with that of operative treatment at 3 months, 6 months, 12 months (mean difference, -7.04; 95% CI, -7.54 to -6.54; $P<0.001$), (mean difference, -7.00; 95% CI, -7.51 to -6.49; $P<0.001$), (mean difference, -7.00; 95% CI, -7.50 to -6.50; $P<0.001$) (**Figure 3**).

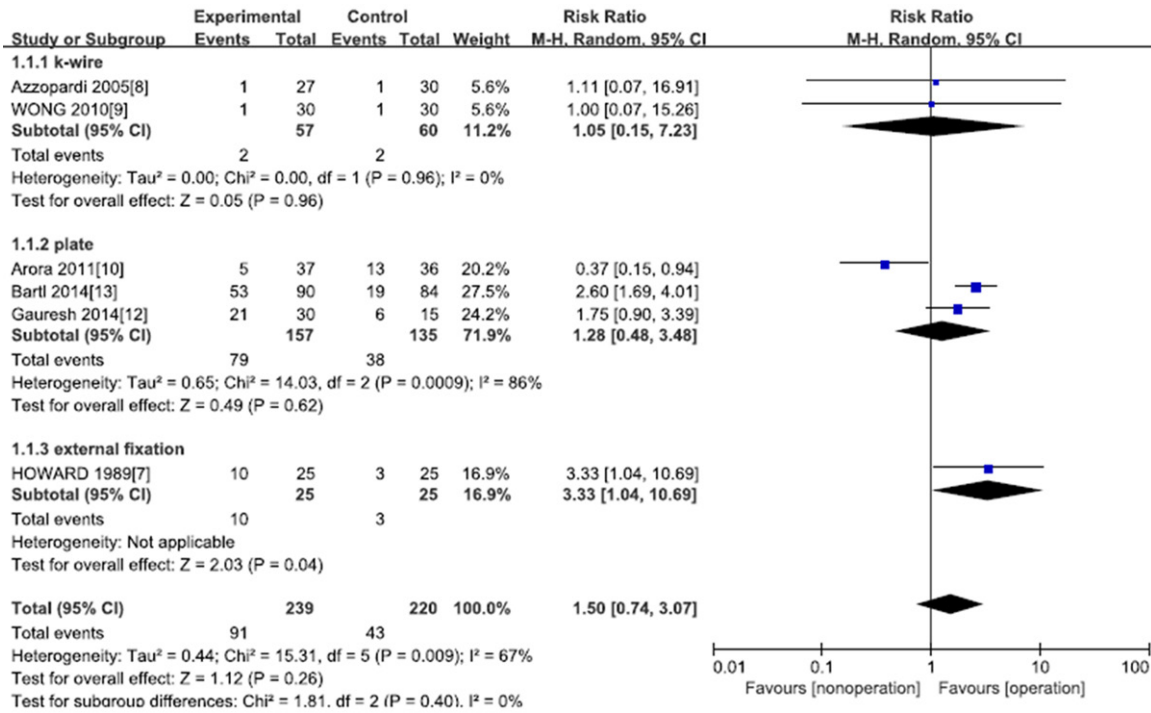We used the fixed effects model for the meta-analysis because of no significant heterogene-

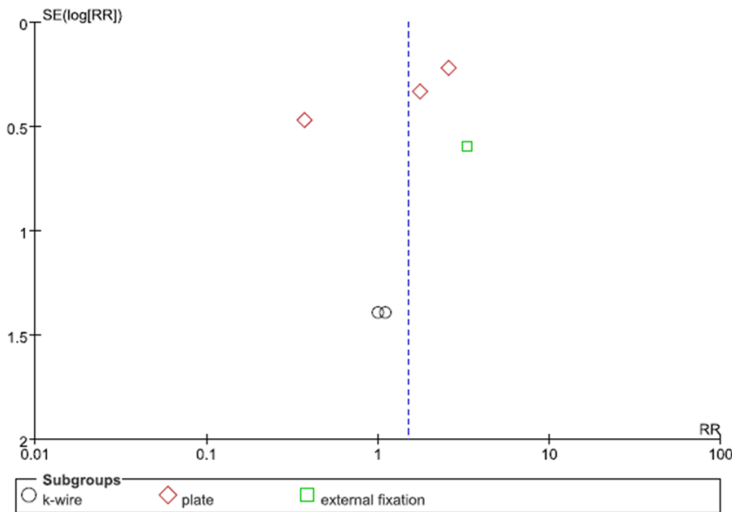**Figure 11.** Forest plot of complication rate for conservative and operative treatment.

Figure 12. Funnel plot of the publication bias.

Functional outcomes

Six representative indicators, which include radial deviation, ulnar deviation, flexion, extension, grip strength, DASH scores, are finally chosen to evaluate the functional results (**Table 3**).

Three randomized controlled trials [9-11] provided radial deviation, the random effects model for meta-analysis was used because significant heterogeneity (I^2=96%) was found between the studies. In the random effects mode, there are no differences in radial deviation between conservative and operative therapy at 3 months, 6 months, 12 months (mean difference, 0.00; 95% CI, -3.21 to 3.21; *P*>0.05), (mean difference, 1.00; 95% CI, -3.49 to 5.49; *P*>0.05), (mean difference, -4.16; 95% CI, -16.15 to 7.84; *P*>0.05) (**Figure 5, Table 3**).

Ulnar deviation was described in the three included studies [9-11]. The random effects model for meta-analysis was used because significant heterogeneity (I^2=96%) among these

ity (I^2=44%) between included trials [8-10] as the result of ulnar variance was evaluated. It is shown that conservative therapy has significant larger ulnar variance than that of conservative therapy at 3 months, 6 months, 12 months (mean difference, 1.10; 95% CI, 0.46 to 1.76; *P*<0.001), (mean difference, 1.10; 95% CI,0.46 to 1.70; *P*<0.001), (mean difference, 0.84; 95% CI, 0.15 to 1.04; *P*<0.001) (**Figure 4**).

trials were found. No significant differences were detached between conservative and operative treatments at 3 months, 6 months, 12 months (mean difference, -2.00; 95% CI, -6.59 to 2.59; *P*>0.05), (mean difference, -3.00; 95% CI, -7.36 to 1.36; P>0.05), (mean difference, -4.73; 95% CI, -15.98 to 6.53; *P*>0.05) (**Figure 6**).

Four randomized controlled trials [9, 10, 11, 13] provided information on palmar flexion, the random effects model was adopted for meta-analysis because of the significant heterogeneity (I^2=90%) of the included studies. It is also observed that no significant differences were found between the two treatment at 3 months, 6 months, 12 months (mean difference, 5.55; 95% CI, -1.50 to 12.61; *P*>0.05), (mean difference, -3.00; 95% CI, -8.31 to 2.31; *P*>0.05), (mean difference, -1.19; 95% CI, -9.14 to 6.76; *P*>0.05) (**Figure 7**).

Four studies [9, 10, 11, 13] assessed the dorsal extension, the random effects mode was used because the significant heterogeneity (I^2=85%) was found among them. We found that no significant differences existed between the two approaches at 3 months, 6 months, 12 months (mean difference, 3.86; 95% CI, -1.32 to 9.03; *P*>0.05), (mean difference, 0.00; 95% CI, -5.28 to 5.28; *P*>0.05), (mean difference, -3.08; 95% CI, -8.05 to 1.89; *P*>0.05) (**Figure 8**).

Three articles [10, 11, 13] were screened out to evaluate the DASH scores. The conservative treatment achieved significant higher DASH scores when compared with operative treatment at 3 months (mean difference, 7.03; 95% CI, 2.33 to 11.74; *P*<0.01). However, no significant differences were detached between the two approaches at 6 months and 12 months (mean difference, 0.20; 95% CI, -7.02 to 7.42; *P*>0.05), (mean difference, 2.22; 95% CI, -0.71 to 5.16; *P*>0.05). Fixed effects model was used because no heterogeneity (I^2=0%) was detached (**Figure 9**).

Two articles [9, 10] were chosen to evaluate the parameter of grip strength. Fixed effects model was used because no significant heterogeneity (I^2=29%) were observed among the studies. The operative therapy obtained significantly higher grip strength when compared with conservative method at 3 months and 6 months (mean difference, -3.20; 95% CI, -5.67 to -0.73;

P<0.05), (mean difference, -3.70; 95% CI, -6.72 to -0.68; *P*<0.05). However, no significant differences were detached at 12 months (mean difference, -3.70; 95% CI, -3.99 to 0.31; *P*>0.05) (**Figure 10**).

Complication rate

Six articles [7-10, 12, 13] were chosen to assess the complication rate after the operation, including median neuropathy, surgical site infection, complex regional pain syndrome, distal radial ulnar joint problems, delayed union, carpal instability. Random effects model was adopted because significant heterogeneity (I^2=67%) were observed between the studies. Conservative treatment showed no significant differences when compared with k-wire and plate (risk ratio, 1.05; 95% CI, 0.15 to 7.23; *P*>0.05), (risk ratio, 1.28; 95% CI, 0.48 to 3.48; *P*>0.05). The external fixation owned a significantly lower complication rate when compared with conservative treatment (risk ratio, 3.33; 95% CI, 1.04 to 10.69; *P*>0.05) (**Figure 11**).

Publication bias and sensitivity analysis

Publication bias were assessed using funnel plot produced by RevMan 5.2 software. The produced funnel plot were symmetrical, which indicated that no significant publication bias existed among the enrolled studies (**Figure 12**). Sensitivity analysis did not identify any marked difference in the relative risk and heterogeneity for the outcome of interest through the methods described above.

Discussion

Distal radius fractures are commonly encountered in orthopaedic practice especially in elderly patients. A number of clinical papers have supported the idea that anatomic restoration of the distal end of the radius is essential to gain superior results [15-17]. Direct relationship between the anatomical result and the functional outcomes were also suggested by several studies [18-20]. However, most elder patients, who suffer from this kind of fracture, with lower functional demands works well in spite of obvious deformity [21]. Anatomical reduction can usually be achieved by closed or open manipulation, however, the agreement regarding the appropriate way of maintaining reduction in unstable fractures remains uncertain.

In radiological parameters, the operative group had significantly better values, which includes radial inclination, ulnar variance, palmar inclination at 3 months, 6 months, 12 months However, the range of movement, including radial deviation, ulnar deviation, flexion, extension, grip strength and DASH scores shows no differences between the two approaches according to the outcomes of the meta-analysis. The results of the meta-analysis differed from the previous outcomes, which were obtained to compare the two approaches for patients with the distal radius fractures. Marcheix et al. [22] reported that palmar flexion to be significantly greater in the operative treatment, along with significantly less loss of reduction in term of ulnar variance, better DASH scores and fewer complication were also achieved when compared with conservative therapy. Study also shows that the superiority of operative treatment with volar locking plates because of anatomical reduction, functional stability, and earlier mobilization, which resulted in better radiographic and functional outcomes when compared with conservative treatment, especially for the patients with severely comminuted fractures, where the anatomical reduction is cumbersome [11]. A retrospective clinical study compared final functional and radiographic outcomes of closed reduction and casting with open reduction and internal fixation (ORIF) with a palmar locking plate for unstable distal radius fractures, no significant difference between the two methods for mean ranges of motion, DASH score and other functional scores were detached [23].

A prospective clinical study, which identified 256 patents from several databases, showed that elderly patients suffering from distal radius fractures, who underwent operative method had better radiological outcomes but higher complications rates (primary from pin track infection in the external groups) [24]. In the study, the complication rate in the operative group would have been significant decreased if pin site infections had been excluded and newer fixation method such as volar locked plates had represented a larger proportion of the same. The outcome of the meta-analysis shows that patients adopting external fixators had less complication rate compared with that of conservative treatments with only one study [7] included with meticulous pin insertion and pin site care. Even when compared with patients accepting internal fixator, significant lower rates of postoperative neuritis, infection, pin loosening and hardware failure existed for the patients adopting external fixator [25]. The application of open reduction and internal fixation (ORIF) with a plate provided the anatomical restoration with patients least likely to develop arthritis, however, this kind of fixation may destroy the blood supply of the distal radius, which may bring complications such as delayed union of the fractures, surgical site infection and complex regional pain syndrome. It is also forbidden that ORIF be used for comminuted fractures because of severe complication caused by it, such as bone nonunion and chronic osteomyelitis. Percutaneous pinning to treat distal radius fractures of the distal radius is a simple procedure which can be done under local anaesthesia. No significant differences were observed between the two methods in term of complication rate. It is also reported that supplementary fixation by K-wire was only marginally superior to cast immobilization alone in reducing displacement of the fracture after closed manipulation, K-wires do not provide better clinical outcomes in unstable, extra-articular, dorsally angulated, fractures of the distal radius neither [8].

To our knowledge, this study is the first meta-analysis to evaluate the conservative and operative treatment for patients with distal radius fractures. A previously mentioned system review compared the radiographic and functional outcomes, major complications rate between the treatment for the distal radius fractures and the conclusion of the article is despite worse radiographic outcomes associated with CI, functional outcomes were no different from those of surgically treated groups for elderly patients [5]. However, the meta-analysis of specific comparison between conservative and operative treatment, which collects high-quality of RCTs, remains absent. Randomized or quasi-randomized controlled clinical trials involving adults with a fracture of the distal radius were collected to carry out a meta-analysis, comparing the results of conservative treatment and external fixation for elderly patients with distal radius fractures, while the conclusion of the meta-analysis was some evidence existed to support the use of external fixation for dorsally displaced fractures of the

distal radius in elderly patients, there was insufficient evidence to confirm better functional outcomes, improved anatomical results and the complication rate between the two approaches remained uncertain [26]. Another meta-analysis, which was carried out to compare the differences between percutaneous pinning and conservative treatment by collecting randomized or quasi-randomized controlled clinical trials, though there is some evidence to support the use of k-wire, the precise role and methods of percutaneous pinning are not established [27].

The present meta-analysis pooled all published RCTs with high quality to provide some evidence of treatment effectiveness and safety of conservative and operative method for distal radius fractures. However, a few limitations existed in the article. First, because of the relatively small sample sizes, insufficient description of method-logic details, and 12 months follow-up could not maintain the complete recovery of radiographic and functional outcomes. Second, language bias may exist because some excellent RCTs are written in non-English. Although the funnel plot did not indicate significant publication bias, which may not suggest the true result of public bias as only six studies [7-10, 12, 13] were enrolled. Third, AO classification [14] were adopted to characterize the fractures in three studies [10, 11, 13], where no relevant details about the fractures were provided in the remaining four articles. Fourth, not every parameter of the radiographic and functional outcome was provided in the meta-analysis, which may bring some limitation in understanding the differences between the two approaches. The specific complications of each fixation were not provided.

Operative treatment seems to be more effective for distal radius fracture compared with conservative treatment when the radiographic outcomes were analyzed, and no significant differences were detached of the functional outcomes and complication rate. More analysis regarding every parameter of the radiographic and functional results and specific complication related to each fixation need to be accomplished, which requires more RCTs with high quality.

Disclosure of conflict of interest

None.

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