

Interventions for treating tuberculous pericarditis (Review)

Mayosi BM



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[Intervention Review]

Interventions for treating tuberculous pericarditis

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ABSTRACT

Background

Tuberculous pericarditis - tuberculosis infection of the pericardial membrane (pericardium) covering the heart - is becoming more common. The infection can result in fluid around the heart or fibrosis of the pericardium, which can be fatal.

Objectives

In people with tuberculous pericarditis, to evaluate the effects on death, life-threatening conditions, and persistent disability of: 1. 6-month antituberculous drug regimens compared with regimens of 9 months or more; 2. corticosteroids; 3. pericardial drainage; and 4. pericardiectomy.

Search strategy

We searched the Cochrane Infectious Diseases Group trials register (January 2005); the Cochrane Controlled Trials Register (Issue 4, 2004); MEDLINE (1966 to January 2005); EMBASE (1980 to January 2005); and checked the reference lists of existing reviews. We also contacted organizations and individuals working in the field.

Selection criteria

Randomized and quasi-randomized controlled trials of treatments for tuberculous pericarditis.

Data collection and analysis

Two reviewers independently assessed trial quality and extracted data. Meta-analysis using fixed effects models calculated summary statistics, provided there was no statistically significant heterogeneity, and expressed results as risk ratio. Study authors were contacted for additional information.

Main results

Four trials met the inclusion criteria, with a total of 469 participants. Treatments tested were adjuvant steroids and surgical drainage.

Two trials with a total of 383 participants tested adjuvant steroids in participants with suspected tuberculous pericarditis in the pre-HIV era. Fewer participants died in the intervention group, but numbers were small (risk ratio [RR] 0.65; 95% confidence interval [CI] 0.36 to 1.16, n = 350). One small trial tested steroids in HIV positive participants with effusion showed a similar pattern (RR 0.50; 95% CI 0.19 to 1.28, n = 58).

One trial examined open surgical drainage compared with conservative management, and showed surgery relieved cardiac tamponade.

Interventions for treating tuberculous pericarditis (Review)

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Authors' conclusions

Steroids could have important clinical benefits, but the trials published to date are too small to demonstrate an effect. This requires large placebo controlled trials. Subgroup analysis could explore whether effusion or fibrosis modify the effects. Therapeutic pericardiocentesis under local anaesthesia and pericardiectomy also require further evaluation.

PLAIN LANGUAGE SUMMARY

Tuberculosis infection of the membrane around the heart is uncommon but life threatening. There is little reliable research on best practice in relation to what drugs to give and when and how to operate.

Currently doctors prescribe antituberculous drugs and remove the membrane if it is making the patient ill. However, doctors vary in the way they manage this condition in terms of what antituberculous drugs to give and when to operate. We found no clinical trials that tackled the length of anti-TB treatment needed. Trials of steroids given with antituberculous drugs suggest possible benefit, but this was not demonstrated conclusively. Open surgical drainage of the fluid accumulating between the heart and the membrane using general anaesthesia was associated with less life threatening re-accumulation of fluid (cardiac tamponade), but with more deaths, but conclusions are not possible as the numbers of patients studied was too small.

BACKGROUND

Definition

Tuberculous pericarditis is tuberculosis infection of the pericardial membrane (pericardium) covering the heart. Infection of the pericardium can result in a build-up of fluid (effusion) around the heart, which constrains its pumping action (tamponade), and is life threatening. Sometimes the infection causes a thickening of the pericardium without an effusion, and this can also constrain the pumping action (constrictive pericarditis). Tuberculous pericarditis manifests with fatigue, shortness of breath, and swelling of the body, and can cause death.

Occurrence

Healthcare practitioners in developing countries where tuberculosis is common are familiar with the condition (Gelfand 1957; Strang 1984). In developed countries, the condition occurs in less than 1% of all people with tuberculosis (Lorell 1997). The human immunodeficiency virus (HIV) epidemic in some countries is resulting in more cases of tuberculosis, and tuberculous pericarditis is becoming more common (Cegielski 1990).

Management

Before antituberculous chemotherapy was discovered, tuberculous pericarditis was usually fatal, either in the acute stage owing to cardiac tamponade or later as a result of constriction and the resulting dissemination of tuberculosis throughout the body (Harvey 1937). With the advent of effective antituberculous chemotherapy in the 1940s, the mortality decreased to about 35% of cases by 1970 (Shapiro 1953; Schepers 1962; Hageman 1964; Rooney 1970). However, even with modern drugs and surgery, the mortality rate remains high and is estimated to be between 8 and 17% (Desai 1979; Bhan 1980).

Debates

1. Length of treatment: various specialists recommend different treatment regimens of different lengths, from 6 months (Strang 1987; Strang 1988) to 9 months (Sagrsta 1988; Fowler 1991), and 12 months (Koh 1994). The first objective of this review was to identify the most effective antituberculous drug combination and the optimum duration of treatment.

2. Steroid drugs: steroids are anti-inflammatory drugs that may be expected to reduce the accumulation of fluid or development of adhesions in the pericardium that are induced by the tuberculosis infection. Some authors recommend the routine use of steroids in all cases of tuberculous pericarditis (Alzeer

1993; Senderovitz 1994; Strang 1997). In contrast, other experts advise that corticosteroids should be reserved for people who are critically ill with recurrent large effusion and who do not respond to pericardial drainage and antituberculous drugs alone (Lorell 1997). This review aimed to assess steroids in all people with tuberculous pericarditis, and to explore whether the type of disease (effusive or constrictive) influenced outcomes.

3. Complete drainage of the pericardial fluid versus drainage for complications: pericardial drainage is sometimes performed as an open surgical procedure under general anaesthesia (Strang 1988), or percutaneously under local anaesthesia with ultrasound or fluoroscopic guidance. The requirement and optimal method for drainage is not known (Strang 1988).

4. When to remove the pericardium surgically in people with tuberculous constrictive pericarditis. Some specialists advise an early conservative approach with surgery applied to cases who do not respond after an initial period of antituberculous medication (Schrir 1967). Others advise early surgery in all affected cases (Quayle 1987).

In reviewing these four areas, we sought any evidence of effect across the whole spectrum of the disease. We then intended to explore whether any effects identified were modified by: (1) the type of disease - early (effusive) disease compared to late forms (constrictive pericarditis); or (2) whether people were immunosuppressed (HIV positive).

OBJECTIVES

In people with tuberculous pericarditis, to evaluate the effects on death, life-threatening conditions, and persistent disability of:

1. 6-month antituberculous drug regimens compared with regimens of 9 months or more;
2. corticosteroids;
3. pericardial drainage;
4. pericardiectomy.

METHODS

Criteria for considering studies for this review

Types of studies

Randomized and quasi-randomized controlled trials.

Types of participants

People of all ages requiring treatment for clinically diagnosed tuberculous pericarditis (effusive, constrictive, or effusive-constrictive).

Types of interventions

Any intervention intended to treat tuberculous pericarditis, including antituberculous drugs, corticosteroids, or surgery.

Types of outcome measures

Primary

All cause death.

Secondary

- Death or disabled at 1 to 2 years follow up. 'Disabled' is defined as a history of restricted physical activity, combined with signs of cardiac compromise prespecified in the protocol (such as clinical, radiographic, and electrocardiogram evidence of persisting pericardial disease).
- Death attributed to pericarditis.
- Occurrence of tamponade requiring drainage of the pericardium (pericardiocentesis).
- Need for excision of the pericardium (pericardiectomy).

Search methods for identification of studies

We have attempted to identify all relevant studies regardless of language or publication status (published, unpublished, in press, and in progress).

We searched the Cochrane Infectious Diseases Group specialized trials register for relevant trials (January 2005) using the search terms 'pericarditis' and 'tuberculosis'. The methods used are published in *The Cochrane Library* in the section on Collaborative Review Groups.

We searched the Cochrane Controlled Trials Register published in *The Cochrane Library* (Issue 4, 2004) using the search terms 'pericarditis' and 'tuberculosis'.

We searched the electronic databases, MEDLINE (1966 to January 2005) and EMBASE (1980 to January 2005), using the topic search terms in combination with the search strategy developed by the Cochrane Collaboration and detailed in the Cochrane Reviewers' Handbook (Clarke 2000).

We contacted organizations and individuals working in the field including the MRC HIV Clinical Trials Centre, London, UK, and Faculty of Medicine, University of Zimbabwe.

External referees were asked to check the completeness of the search strategy, and to identify any additional unpublished, ongoing, and planned trials.

We examined existing reviews of tuberculous pericarditis for relevant citations (Schrire 1967; Bhan 1980; Fowler 1991; Fowler 1992; Alzeer 1993; Senderovitz 1994; Fowler 1995; Cisneros 1996; Dooley 1997; Strang 1997).

Data collection and analysis

Selection of studies

BM Mayosi (BMM) and M Ntsheke (MN) independently applied the inclusion criteria to all identified trials.

Data extraction and management

Using data from the published articles and unpublished information supplied by the trialists, we performed an analysis of all participants as they were randomized. We excluded only those who were truly lost to follow up and in whom it had not been possible to determine the relevant outcomes.

Assessment of risk of bias in included studies

We assessed the methodological quality of each included trial for their adequacy of concealment of allocation, generation of allocation sequence, blinding, and follow up of participants, using the standard methods of the Cochrane Infectious Diseases Group.

Data synthesis

We used meta-analysis with a fixed effects model to calculate the summary statistics, provided there was no statistically significant heterogeneity, and expressed results as relative risk.

We combined trials that included participants with the different clinical syndromes of tuberculous pericarditis (pericardial effusion and constrictive pericarditis) to estimate the size and significance of the effect of adjuvant corticosteroids on the outcomes.

RESULTS

Description of studies

See: [Characteristics of included studies](#).

Four trials met the inclusion criteria, three conducted in South Africa and one in Zimbabwe, with a total of 469 participants. Trial size varying from 28 to 240 participants (see Characteristics of

included studies). The three South African trials were conducted in the period before the human immunodeficiency virus (HIV) pandemic (Schrire 1959; Strang 1987; Strang 1988). One trial was conducted in HIV positive people (Hakim 2000).

Participants were either those with tuberculous pericardial effusion (Schrire 1959; Strang 1988; Hakim 2000) or with tuberculous constrictive pericarditis (Strang 1987).

Interventions examined were: (1) adjuvant steroids (Schrire 1959; Strang 1987; Strang 1988; Hakim 2000); and (2) open surgical drainage on admission in participants with tuberculous pericardial effusion (Strang 1988).

The length of follow up was unspecified in Schrire 1959, 18 months in Hakim 2000, and two years in Strang 1987 and Strang 1988.

The outcomes measured are listed in the Characteristics of included studies. All cause death was not reported in Strang 1987 and Strang 1988; this information was obtained directly from the authors. Strang defined 'favourable clinical status at 24 months' if the following criteria were fulfilled or if only one was still abnormal: unrestricted physical activity; pulse rate < 100/minute; jugular venous pulse < 5 cm; arterial pulsus paradoxus < 10 mm Hg; absence of ascites or oedema; cardiothoracic ratio < 55%; electrocardiogram voltage > 6 mm in V6 or > 4 mm along the frontal axis. Hakim 2000 did not report a category of deaths from pericarditis, neither were outcomes related to repeat pericardiocentesis and pericardiectomy reported.

No information is given in Schrire 1959 about the basis for the diagnosis of tuberculous pericarditis. In Strang 1987, a definite diagnosis of tuberculosis was made in only 10% (14/143) of the participants with constrictive pericarditis, and in the pericardial effusion study Strang 1988, 144/240 (60%) of participants had evidence confirming or supporting a diagnosis of active tuberculosis. The tuberculosis diagnosis was confirmed in 22 (38%) of the participants in the Hakim 2000 (12 [41%] and 10 [35%] in the treatment and control groups, respectively).

Risk of bias in included studies

Three trials appeared adequately concealed (Strang 1987; Strang 1988; Hakim 2000). In one trial, allocation was alternate and was therefore not concealed (Schrire 1959).

Randomization in Strang 1987 and Strang 1988 was conducted using a register drawn up centrally in the UK. The investigators in South Africa entered participants into the trials consecutively according to the register, without prior knowledge of who was receiving active or placebo treatment. In the Zimbabwe study (Hakim 2000), randomization was achieved using a computer-generated randomization list with an equal number assigned to receive prednisolone and placebo.

Strang 1987 and Strang 1988 were double blind. Schrire 1959 did not use blinding.

Strang 1987 and Strang 1988 reported on patient characteristics which did not appear unbalanced. Schrire 1959 did not provide information about the clinical characteristics of the participants. Strang 1987 and Strang 1988 did not use an intention-to-treat analysis, resulting in the exclusion of 17.5 to 20% of participants from analysis because of failure to comply with the study protocol. In the published data, 29/143 participants (20%) were excluded from analysis in the pericardial constriction study (Strang 1987), and 42/240 participants (17.5%) were excluded from analysis in the pericardial effusion trial (Strang 1988). Additional unpublished data obtained from the authors regarding the participants who were not included in the analyses indicated that less than 10% of participants were lost to follow up.

Effects of interventions

Length of regimen

No randomized controlled trials were found that compared anti-tuberculous drug regimens of different durations in tuberculous pericarditis, or trials that examined the effects of pericardiectomy.

Steroids (unknown HIV status)

A combined analysis of participants with effusive and constrictive pericarditis (Strang 1987; Strang 1988) suggests that steroids may be associated with fewer deaths, but this could have arisen by chance (relative risk [RR] 0.65; 95% confidence interval [CI] 0.36 to 1.16). For other outcomes, the group receiving steroids were associated with fewer morbid outcomes, but none were statistically significant (need for repeat pericardiocentesis [RR 0.45; 95% CI 0.20 to 1.05], need for pericardiectomy [RR 0.85; 95% CI 0.51 to 1.42]). In the Schrire trial of 28 participants, all 4 participants who required pericardiectomy were in the treatment group (RR 9.00; 95% CI 0.53 to 152.93) (Schrire 1959).

The effect of steroids on death and persisting pericardial disease at 2 years follow up was explored. There was significant statistical heterogeneity between the trial of participants with effusion (Strang 1988) and the trial of participants with constriction (Strang 1987) with regard to this outcome (chi-square 4.88, df = 1), so their results were considered separately. Participants on steroids for pericardial effusion were more likely to be cured at 24 months (alive and symptom free) than participants on placebo (RR 0.48; 95% CI 0.29 to 0.80) (Strang 1988). No difference was demonstrated in the trial of participants with suspected constrictive pericarditis (RR 1.08; 95% CI 0.65 to 1.81) (Strang 1987).

We conducted a sensitivity analysis to explore potential effects of patient loss to follow-up in the trial of steroids in effusion (Strang 1988). In the 'worst case scenario', assuming all participants lost to follow up died, statistical significance was lost (12 lost in treatment

group, 7 in placebo group; sensitivity analysis assuming all died: RR 0.78; 95% CI 0.52 to 1.18).

Steroids (HIV positive participants)

Steroids were associated with fewer deaths in HIV positive participants, but this was not statistically significant (RR 0.50; 95% CI 0.19 to 1.28, Hakim 2000). There was no effect of steroids on the tendency to develop pericarditis (RR 1.00; 95% CI 0.15 to 6.63). The following outcomes were not reported as separate outcomes in the published manuscript: death from pericarditis, requirement for repeat pericardiocentesis, and death or persisting disease at 1 to 2 years.

Open surgical drainage for effusion

In a comparison of routine open surgical drainage on admission versus no open surgical drainage comparison, 122/240 participants consented to participate (Strang 1988). Seven participants in the drainage group and 3 participants in the no drainage group were lost to follow up.

All cause death was similar in both groups (RR 0.96; 95% CI 0.30 to 3.15). Cardiac tamponade was effectively prevented by open drainage (odds ratio 0.04; 95% CI 0.00 to 0.64). Participants who underwent open surgical drainage were more likely to have a worse clinical status or to have died at 24 months follow-up than those who did not, although this was not statistically significant (RR 1.74; 95% CI 0.88 to 3.42).

Open surgical drainage was associated with fewer patients requiring pericardiectomy, but this was not statistically significant (RR 0.39; 95% CI 0.08 to 1.91).

There were no trials of percutaneous drainage of the pericardium under local anaesthesia.

DISCUSSION

Antituberculous drug regimens

We aimed to identify the optimal drug combination and treatment duration, but found no trials. As there are no biological reasons to believe that chemotherapy for tuberculous pericarditis should be longer than treatment of other tuberculous disease, recommendations for current standard regimens seem appropriate (Garner 2002), but this is not based on trials specifically treating patients with tuberculous pericarditis.

Adjuvant steroids

Steroids show a potentially large beneficial effect (approximately 50%) on death and requirement for repeat pericardiocentesis, but wide confidence intervals around the point estimates that overlap unity are consistent with a null effect. Only a subgroup analysis (participants with tuberculous pericardial effusion and unknown HIV status) showed a significant effect of adjuvant steroids on death or persisting disease at 24 months follow up (Strang 1988). Therefore, there is uncertainty regarding the beneficial effect of adjuvant steroids in participants with suspected tuberculous pericarditis.

The review has highlighted several problems with the existing trials of adjuvant steroids in tuberculous pericarditis:

1. Trials were generally too small to detect mortality difference in tuberculous pericarditis.
2. Most diagnoses were made clinically, so the study groups potentially include participants with pericardial disease caused by other conditions.
3. Rifampicin induces the liver metabolism of corticosteroids, so it is possible that the doses given in the trials are too low. Prednisone 120 mg (rather than 60 mg) may be more appropriate for adults (Commerford 1991).
4. Trials have divided participants into either 'effusive' or 'constrictive' tuberculous pericarditis. However, the combined picture of effusive-constrictive pericarditis is a common clinical presentation in South Africa (Commerford 1991). The management of this group of participants is problematic because pericardiocentesis does not relieve the impaired filling of the heart and surgical removal of the fibrinous exudate coating the visceral pericardium is not possible. In addition to antituberculous chemotherapy, serial echocardiography is used to detect the development of a pericardial skin that is amenable to surgical stripping. The place of corticosteroids is unknown in such patients.

Pericardial drainage

Strang 1988 found open surgical drainage under general anaesthesia to be effective in preventing cardiac tamponade and possibly subsequent progression to constriction requiring pericardiocentesis. These effects were counterbalanced by more deaths attributed to pericarditis and a poorer clinical status at 24 months. There are no randomized controlled trials of closed percutaneous drainage under local anaesthesia.

Pericardectomy

There are no randomized controlled trials studying the issue of timing of pericardectomy in people with a diagnosis of tuber-

culous constrictive pericarditis. The current recommendation of pericardectomy for persistent signs of constriction after at least six weeks of antituberculous chemotherapy is based on expert opinion (Commerford 1991).

AUTHORS' CONCLUSIONS

Implications for practice

1. No trials have assessed antituberculous drug regimens in tuberculous pericarditis. Regimens are therefore based on evidence from trials of pulmonary disease.
2. There tended to be fewer deaths in patients receiving steroids, but trials and the meta-analysis did not reach statistical significance; nor was there sufficient data to explore whether any effect of steroids was in all patients, or confined to particular subgroups, such as patients with effusive or constrictive disease.
3. Routine open surgical drainage abolishes the occurrence of cardiac tamponade; this expensive and invasive procedure confers no mortality benefit, and may be associated with a poorer clinical status at 24 months.
4. There is no clinical trial information on which to base recommendations regarding the indications for and the timing of pericardectomy in tuberculous constrictive pericarditis.

Implications for research

We believe an adequately powered randomized placebo controlled trial of adjuvant steroids and percutaneous drainage in tuberculous pericarditis is required. The trial should include participants with tuberculous pericardial effusion, effusive-constrictive pericarditis, and constriction. Outcomes should be stratified by human immunodeficiency virus status.

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* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies [ordered by study ID]

Hakim 2000

Methods	Computer generated randomization list Double blind placebo controlled study
Participants	58 participants who were on antituberculous chemotherapy for suspected tuberculous pericarditis
Interventions	Intervention: Prednisolone for the first 6 weeks of antituberculous chemotherapy Dose for adults: 60 mg for the first week, and tapering by 10 mg every week Control: Placebo
Outcomes	Primary outcomes: Death Resolution of pericardial effusion Secondary outcomes: Resolution of pretreatment symptoms and signs, and ECG changes Corticosteroid related adverse effects
Notes	Study location: Harare, Zimbabwe

Schrire 1959

Methods	Alternate allocation of 28 patients to adjuvant steroids or no steroids
Participants	28 participants who were on antituberculous chemotherapy for suspected tuberculous pericarditis
Interventions	Steroids: While under antituberculous cover, cortisone with a loading dose of 300 mg and maintenance dose of 100 mg daily for several weeks was prescribed for 14 participants At a later date, prednisolone 60 mg/day with a maintenance dose of 20 mg was substituted
Outcomes	Constriction requiring pericardiectomy
Notes	Study location: Cape Town, South Africa The characteristics of the included participants were not provided Length of follow up not specified

Strang 1987

Methods	Central randomization Double blind placebo controlled study
Participants	143 participants with suspected tuberculous constrictive pericarditis aged 5 years and older

Strang 1987 (Continued)

Interventions	Intervention: Prednisolone for the first 11 weeks of antituberculous chemotherapy. Dose for adults: 60 mg for the first 4 weeks; 30 mg for weeks 5 to 8; 15 mg for weeks 9 to 10; and 5 mg for week 11 Control: Placebo
Outcomes	Death Death from pericarditis Favourable clinical status at 24 months Pericardiectomy
Notes	Study location: Umtata, South Africa Participants lost to follow up: we determined from published and unpublished data that 8 participants in the prednisolone group, and 6 placebo participants were lost to follow up Their outcome is unknown The participants in the treatment and control groups were well matched in terms of clinical characteristics and completion of antituberculous chemotherapy

Strang 1988

Methods	Central randomization Double blind placebo controlled study Factorial design
Participants	240 participants aged 5 years or more diagnosed as having active tuberculous pericardial effusion
Interventions	Complete open surgical drainage on admission compared with no open drainage (122/240 participants consented) Prednisone versus placebo - similar regimen to Strang 1987; (all 240 participants)
Outcomes	Death Death from pericarditis Favourable clinical status at 24 months Tamponade requiring pericardiocentesis Constriction Pericardiectomy
Notes	Study location: Umtata, South Africa Complete open surgical drainage comparison: 8/64 participants in the intervention group did not receive open surgical drainage Participants lost to follow up: we determined from published and unpublished data that 12 participants in the prednisolone group, and 7 participants in the placebo group were lost to follow up in the effusion study. In the drainage versus no drainage comparison, the losses to follow up were 7 and 3 participants respectively Their outcome is unknown The participants in the treatment and control groups were well matched in terms of their clinical characteristics and completion of antituberculous chemotherapy

DATA AND ANALYSES

Comparison 1. Tuberculous pericarditis: steroids vs placebo

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Death from all causes	2	350	Risk Ratio (M-H, Fixed, 95% CI)	0.65 [0.36, 1.16]
2 Death from pericarditis	2	350	Risk Ratio (M-H, Fixed, 95% CI)	0.43 [0.18, 0.99]
3 Repeat pericardiocentesis	1	221	Risk Ratio (M-H, Fixed, 95% CI)	0.45 [0.20, 1.05]
4 Pericardiectomy	3	378	Risk Ratio (M-H, Fixed, 95% CI)	0.85 [0.51, 1.42]
5 Death or persisting disease at 2 years follow up	2	350	Risk Ratio (M-H, Fixed, 95% CI)	0.69 [0.48, 0.98]

Comparison 2. Tuberculous pericarditis in HIV positive participants: steroids vs placebo

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Death from all causes	1	58	Risk Ratio (M-H, Fixed, 95% CI)	0.5 [0.19, 1.28]
2 Constrictive pericarditis	1	58	Risk Ratio (M-H, Fixed, 95% CI)	1.0 [0.15, 6.63]

Comparison 3. Tuberculous pericardial effusion: open surgical drainage vs standard care

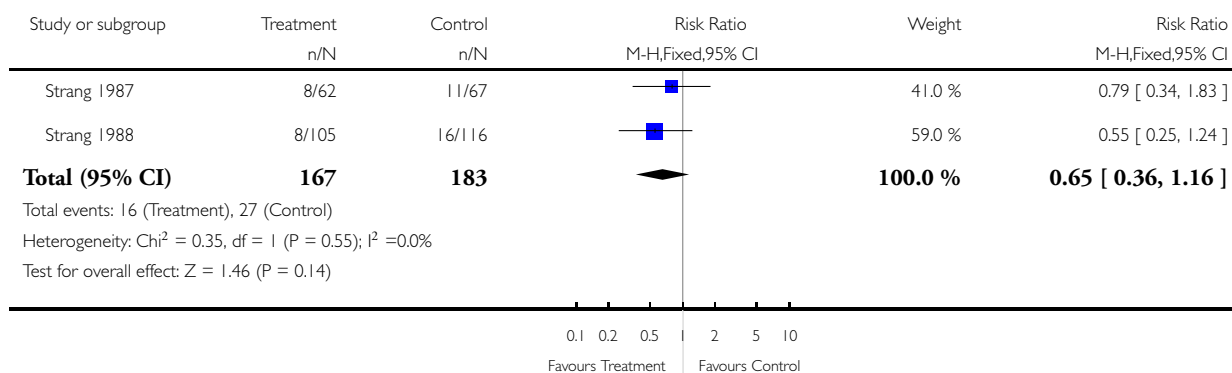
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Death from all causes	1	112	Risk Ratio (M-H, Fixed, 95% CI)	0.96 [0.30, 3.15]
2 Death from pericarditis	1	112	Risk Ratio (M-H, Fixed, 95% CI)	1.29 [0.30, 5.49]
3 Repeat pericardiocentesis	1	112	Risk Ratio (M-H, Fixed, 95% CI)	0.04 [0.00, 0.64]
4 Pericardiectomy	1	112	Risk Ratio (M-H, Fixed, 95% CI)	0.39 [0.08, 1.91]
5 Death or persisting disease at 2 years follow up	1	112	Risk Ratio (M-H, Fixed, 95% CI)	1.74 [0.88, 3.42]

Analysis 1.1. Comparison 1 Tuberculous pericarditis: steroids vs placebo, Outcome 1 Death from all causes.

Review: Interventions for treating tuberculous pericarditis

Comparison: 1 Tuberculous pericarditis: steroids vs placebo

Outcome: 1 Death from all causes

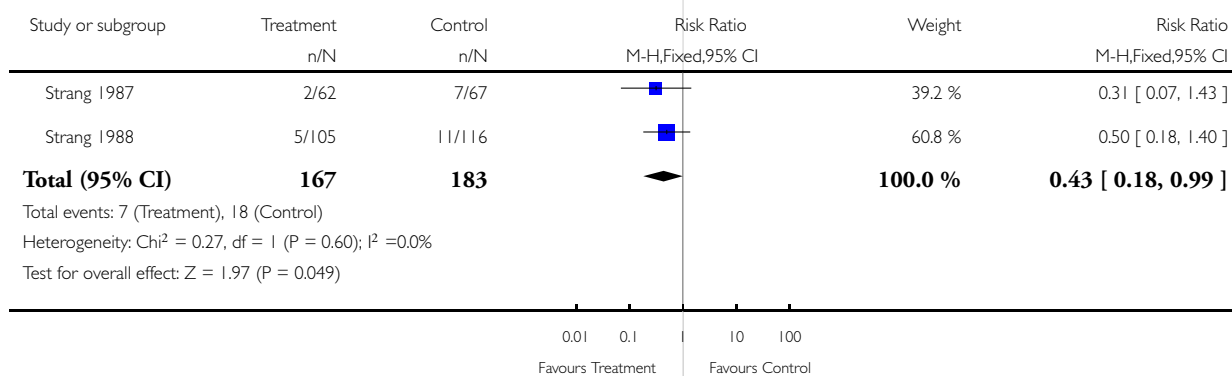


Analysis 1.2. Comparison 1 Tuberculous pericarditis: steroids vs placebo, Outcome 2 Death from pericarditis.

Review: Interventions for treating tuberculous pericarditis

Comparison: 1 Tuberculous pericarditis: steroids vs placebo

Outcome: 2 Death from pericarditis

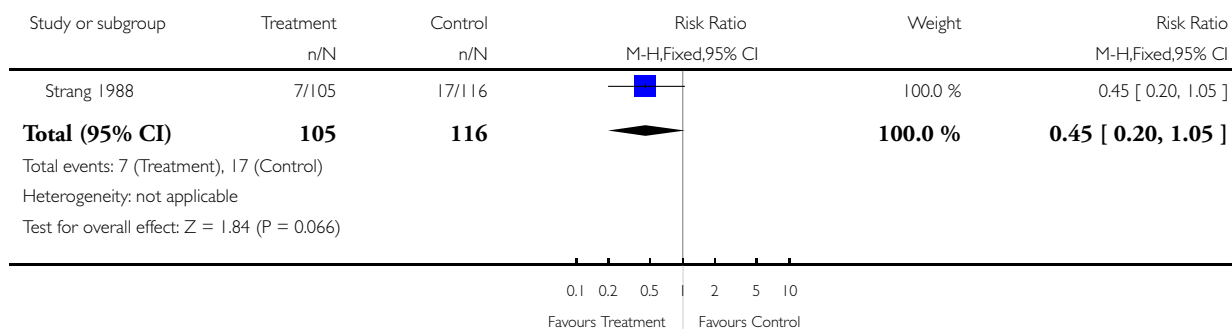


Analysis 1.3. Comparison 1 Tuberculous pericarditis: steroids vs placebo, Outcome 3 Repeat pericardiocentesis.

Review: Interventions for treating tuberculous pericarditis

Comparison: 1 Tuberculous pericarditis: steroids vs placebo

Outcome: 3 Repeat pericardiocentesis

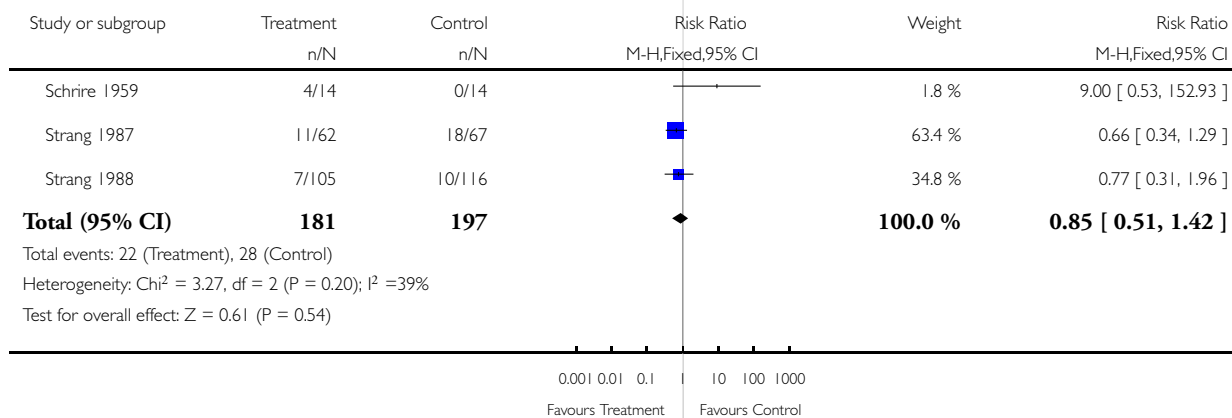


Analysis 1.4. Comparison 1 Tuberculous pericarditis: steroids vs placebo, Outcome 4 Pericardiectomy.

Review: Interventions for treating tuberculous pericarditis

Comparison: 1 Tuberculous pericarditis: steroids vs placebo

Outcome: 4 Pericardiectomy

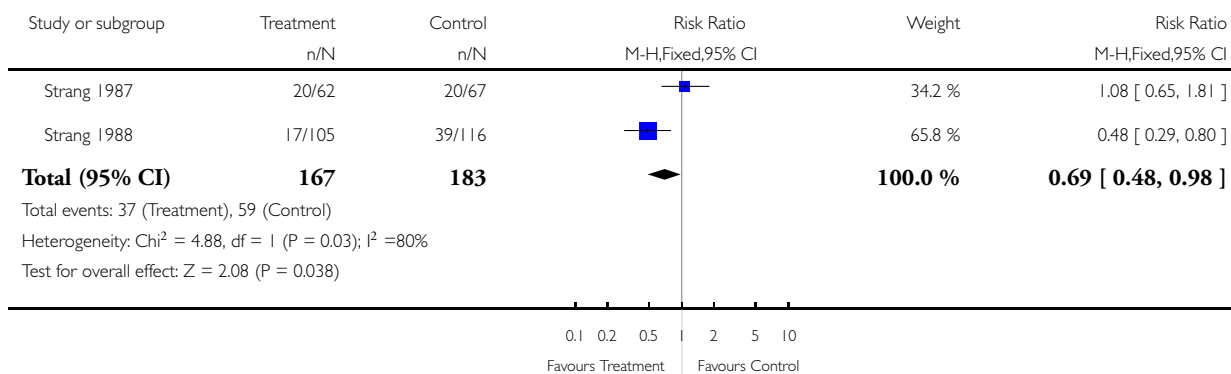


Analysis 1.5. Comparison 1 Tuberculous pericarditis: steroids vs placebo, Outcome 5 Death or persisting disease at 2 years follow up.

Review: Interventions for treating tuberculous pericarditis

Comparison: 1 Tuberculous pericarditis: steroids vs placebo

Outcome: 5 Death or persisting disease at 2 years follow up

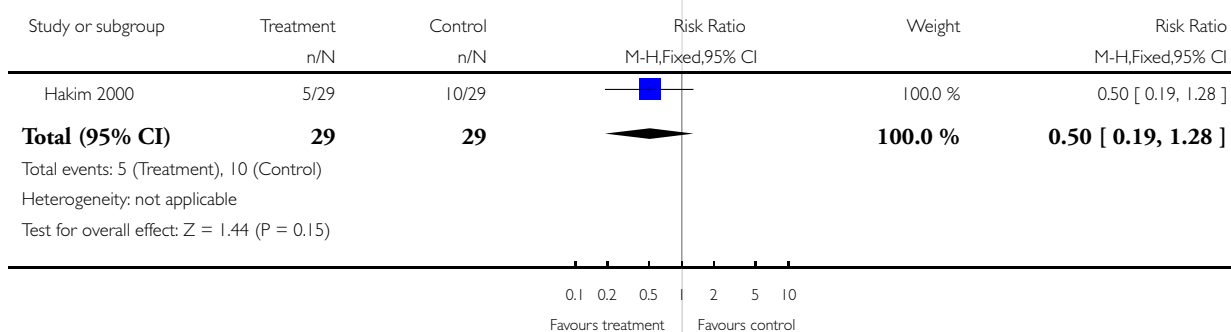


Analysis 2.1. Comparison 2 Tuberculous pericarditis in HIV positive participants: steroids vs placebo, Outcome 1 Death from all causes.

Review: Interventions for treating tuberculous pericarditis

Comparison: 2 Tuberculous pericarditis in HIV positive participants: steroids vs placebo

Outcome: 1 Death from all causes

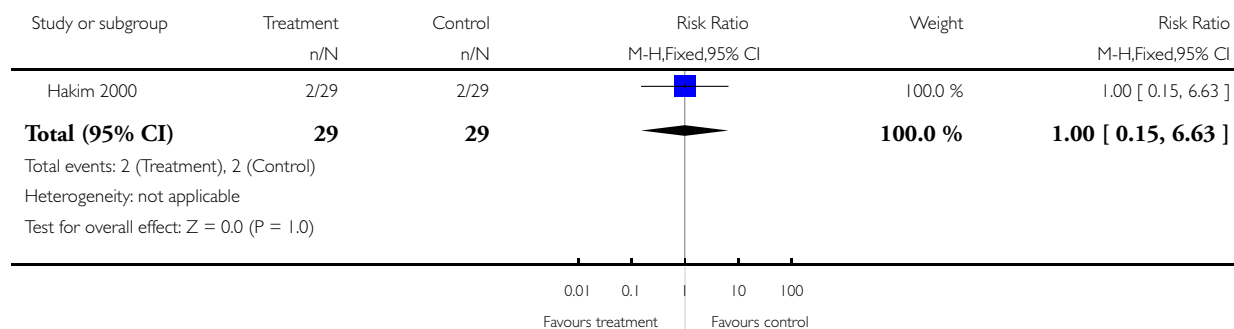


Analysis 2.2. Comparison 2 Tuberculous pericarditis in HIV positive participants: steroids vs placebo, Outcome 2 Constrictive pericarditis.

Review: Interventions for treating tuberculous pericarditis

Comparison: 2 Tuberculous pericarditis in HIV positive participants: steroids vs placebo

Outcome: 2 Constrictive pericarditis

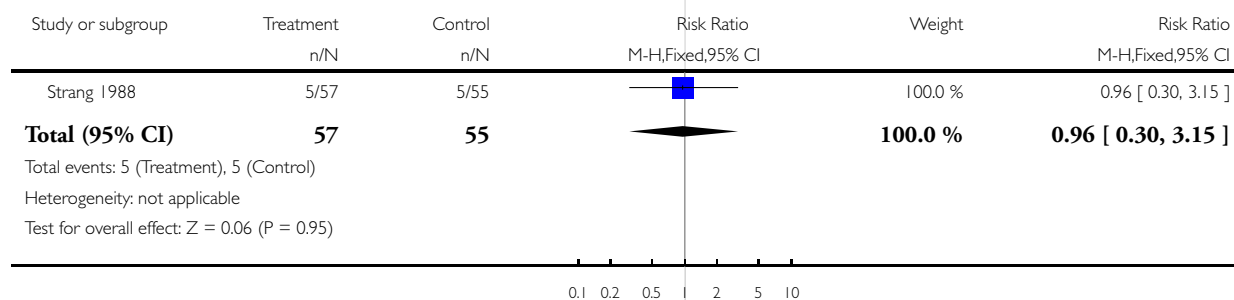


Analysis 3.1. Comparison 3 Tuberculous pericardial effusion: open surgical drainage vs standard care, Outcome 1 Death from all causes.

Review: Interventions for treating tuberculous pericarditis

Comparison: 3 Tuberculous pericardial effusion: open surgical drainage vs standard care

Outcome: 1 Death from all causes

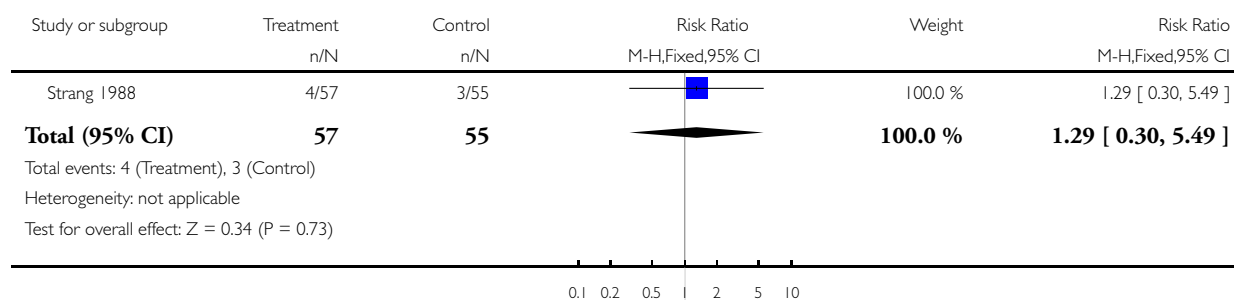


Analysis 3.2. Comparison 3 Tuberculous pericardial effusion: open surgical drainage vs standard care, Outcome 2 Death from pericarditis.

Review: Interventions for treating tuberculous pericarditis

Comparison: 3 Tuberculous pericardial effusion: open surgical drainage vs standard care

Outcome: 2 Death from pericarditis

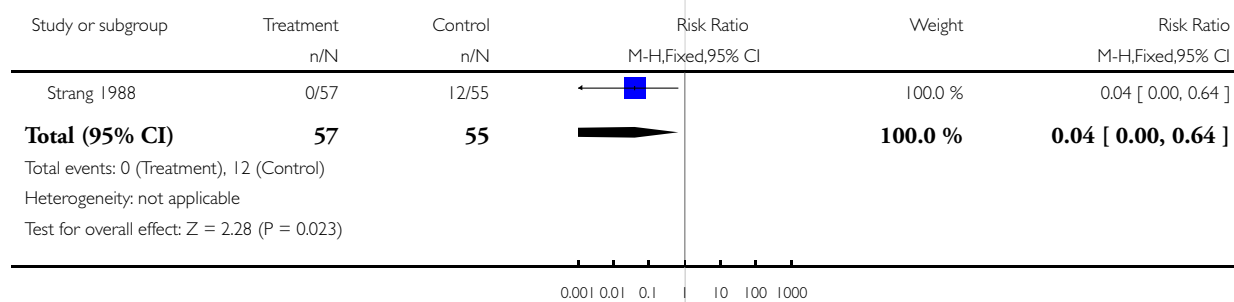


Analysis 3.3. Comparison 3 Tuberculous pericardial effusion: open surgical drainage vs standard care, Outcome 3 Repeat pericardiocentesis.

Review: Interventions for treating tuberculous pericarditis

Comparison: 3 Tuberculous pericardial effusion: open surgical drainage vs standard care

Outcome: 3 Repeat pericardiocentesis

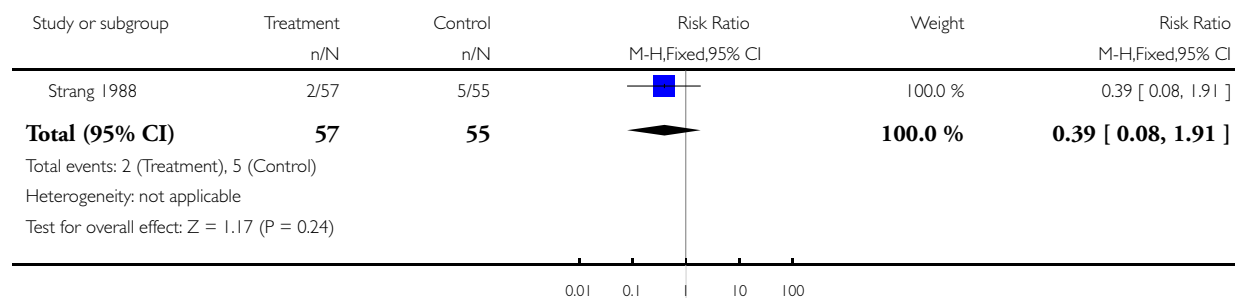


Analysis 3.4. Comparison 3 Tuberculous pericardial effusion: open surgical drainage vs standard care, Outcome 4 Pericardiectomy.

Review: Interventions for treating tuberculous pericarditis

Comparison: 3 Tuberculous pericardial effusion: open surgical drainage vs standard care

Outcome: 4 Pericardiectomy

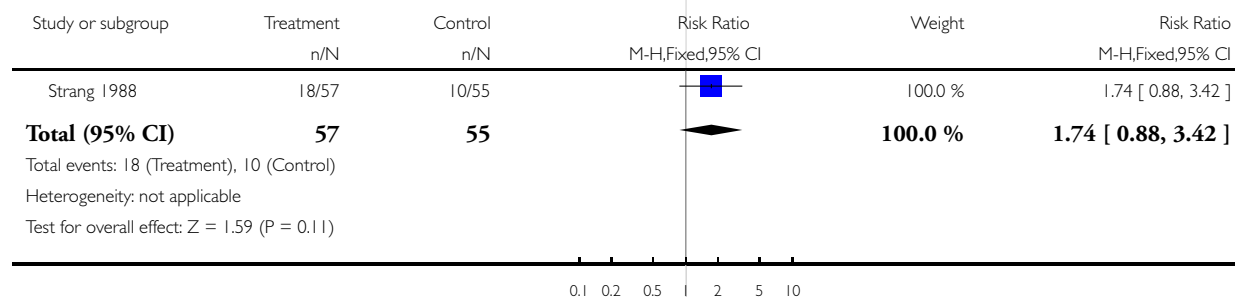


Analysis 3.5. Comparison 3 Tuberculous pericardial effusion: open surgical drainage vs standard care, Outcome 5 Death or persisting disease at 2 years follow up.

Review: Interventions for treating tuberculous pericarditis

Comparison: 3 Tuberculous pericardial effusion: open surgical drainage vs standard care

Outcome: 5 Death or persisting disease at 2 years follow up



WHAT'S NEW

Last assessed as up-to-date: 16 June 2002.

10 November 2008 Amended Converted to new review format with minor editing.

HISTORY

Protocol first published: Issue 4, 1997

Review first published: Issue 3, 1998

12 January 2005	Amended	New studies found but not yet included or excluded.
18 May 2003	Amended	Minor update
17 June 2002	New citation required and conclusions have changed	Substantive amendment. Issue 4, 2002: Hakim 2000 added. New studies found and included or excluded

CONTRIBUTIONS OF AUTHORS

BM Mayosi: conceived the idea for the review, helped design and write the protocol, extract and analyse data, write the review and review updates. M Ntsekhe: contributed to the first review update. JA Volmink: helped design and write the protocol, extract and analyse data, and write the review. PJ Commerford: helped write the protocol and review.

DECLARATIONS OF INTEREST

We certify that we have no affiliations with or involvement in any organization or entity with a direct financial interest in the subject matter of the review (eg employment, consultancy, stock ownership, honoraria, expert testimony).

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INDEX TERMS

Medical Subject Headings (MeSH)

Adrenal Cortex Hormones [therapeutic use]; Antitubercular Agents [therapeutic use]; Drainage; Pericardiectomy; Pericarditis, Tuberculous [*drug therapy; *surgery]; Pericardium [surgery]; Randomized Controlled Trials as Topic

MeSH check words

Humans