

# Gentamicin-collagen sponges for the prevention of surgical-site infections: a meta-analysis of randomized controlled trials

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## OBJECTIVE

To study the effectiveness of gentamicin-collagen sponges (GCSs) for the prevention of surgical-site infections (SSIs).

## METHODS

➤ A systematic search of Pubmed and Scopus databases was performed (up to 04/2015) to identify randomized controlled trials (RCTs) evaluating the efficacy of GCSs for the prevention of SSIs.

➤ A random effects model was applied.

## RESULTS

### Characteristics of the included studies

Our literature search identified 1969 publications, of which 1908 were excluded after abstract review. Sixty-one studies were assessed in full text. Twenty-one studies (8472 participants) fulfilling our inclusion criteria were included. Sixteen studies were performed in Europe, 2 in the United States, 2 in Turkey, and one in Mexico. Nine studies were multicenter and 12 were single-center trials. Fifteen studies were non-funded, while 6 studies were funded directly by the company. Eighteen studies compared GCSs patients with patients that did not receive any sponge. Two studies compared GCSs patients with a control group receiving a non-antibiotic sponge. One study had three arms comparing GCSs, no-sponge, and non-antibiotic sponge patients. Eight studies analyzed the role of GCSs after colorectal surgery. Four studies analyzed the role of GCSs in the development of SSIs after cardiac surgery for sternal wound infections. Two studies analyzed the role of GCSs after pilonidal sinus excision. The remaining studies analyzed the role of GCSs in other types of surgery, including orthopedic surgery (hip arthroplasty), hidradenitis suppurativa surgery, abdominal surgery, splenectomy, anorectal abscess suture, groin hernia surgery, and mastectomy. Eleven studies had a Jadad score of  $\geq 3$  and 10 studies had a lower score.

Thirteen studies provided a definition for SSIs, while 8 studies did not. Nine studies provided a definition for SSIs based on CDC criteria. The populations of the included studies are characterized by significant heterogeneity regarding the type of operation and the risk factors for the development of SSIs.

### Prevention of infections

Gentamicin-collagen sponge patients were associated with a lower risk for SSIs in several analyses. The overall risk for SSIs was significantly lower in the GCSs group compared to the control group [21 studies, 8472 participants, risk ratio (RR) 0.65, 95% CI 0.49–0.84, Figure]. There was significant heterogeneity. The GCSs group was associated with a lower risk for SSIs in low-quality studies but no difference was observed in high-quality studies. Lower risk for SSIs was observed in double-blind studies, single-center studies, studies performed in Europe or in other countries, and non-funded studies. Fewer infections were observed in clean procedures, but no difference was observed in clean-contaminated or contaminated-dirty procedures.

### Gentamicin-collagen sponges in specific types of surgery

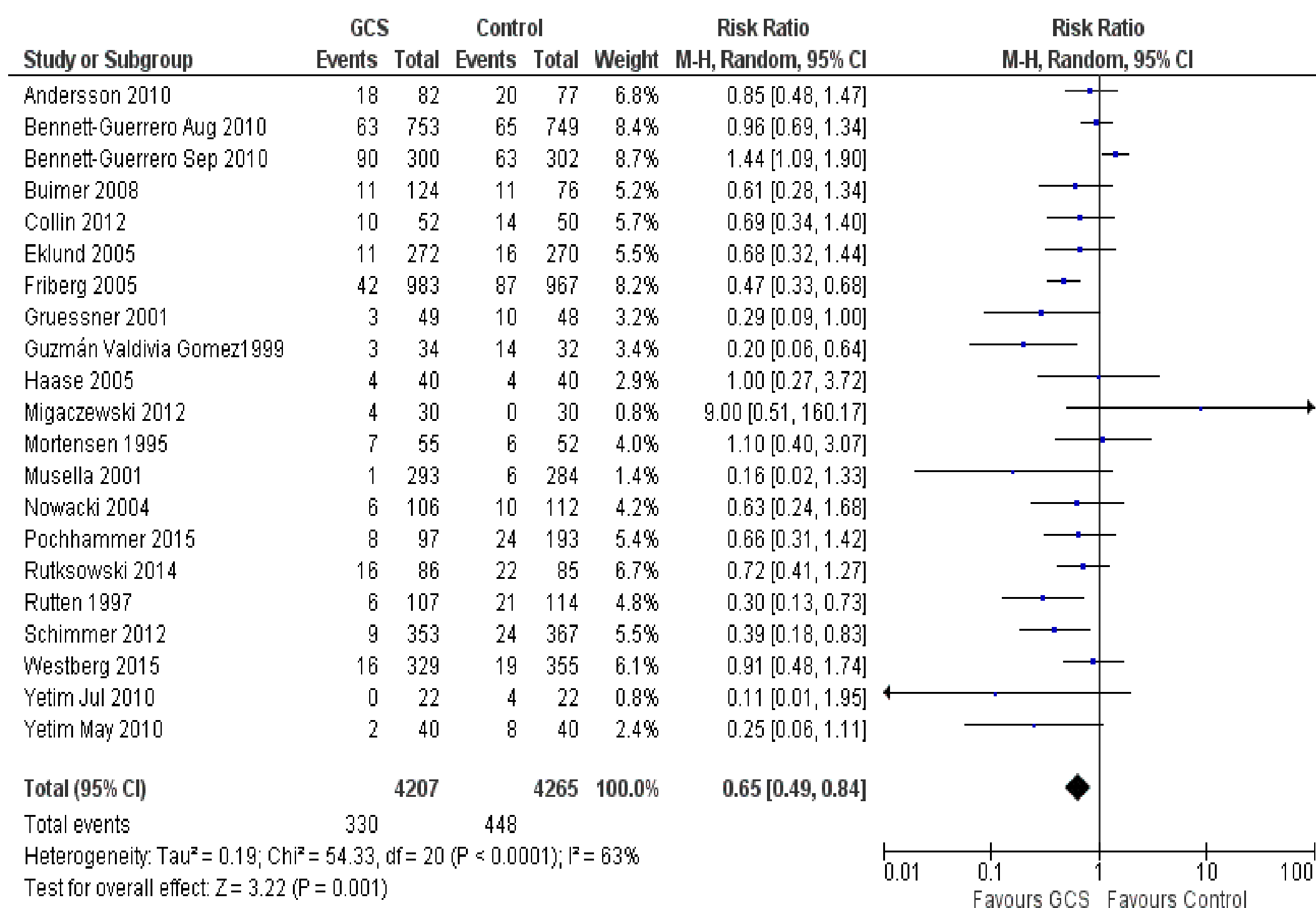
Among patients undergoing cardiac surgery, the risk of sternal SSIs was significantly lower in the GCSs group compared to the control group (4 studies, 4714 participants, RR 0.61, 95% CI 0.39–0.97). Subgroup analyses showed a difference for deep sternal wound infections, but no benefit was observed for superficial sternal wound infections or mediastinitis (0.50, 0.19–1.33). Among patients undergoing colorectal surgery, no benefit with GCSs was observed (8 studies, 1781 participants, 0.69, 0.44–1.08). In pilonidal sinus operations, patients did not benefit from the use of GCSs. A pooled analysis for other surgical procedures (7 studies, 1738 patients) showed no difference between groups.

## Mortality

Eight studies provided data regarding all-cause mortality (5697 patients). When GCSs patients were compared to the control group, no benefit and only a trend for lower risk were observed in all-cause mortality for all studies (0.77, 0.56–1.06); subgroup analyses found no difference in either colorectal or cardiac surgery.

## CONCLUSION:

In conclusion, the present study provides additional evidence for the effectiveness of GCSs regarding the development of SSIs. Gentamicin collagen sponges were associated with a lower risk for the development of SSIs. Further high-quality randomized studies with comparable patient characteristics and a common definition of “infection” are required to confirm the effectiveness of GCSs in specific types of surgery.



**Figure.** Forest plot depicting the risk ratios for GCS-associated infections, when patients with GCS were compared to control group. The vertical line indicates the “no difference” point between the 2 groups; *squares* indicate risk ratios; *diamonds*, pooled risk ratios for all studies; *horizontal lines*, 95% confidence intervals; *events* represent number of infections; *total* refers to number of procedures