‘Preventie van mediastinitis na openhartchirurgie’

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Disclosure belangen spreker

(potentiële) belangenverstrengeling	Geen / Zie hieronder
Voor bijeenkomst mogelijk relevante relaties met bedrijven	Bedrijfsnamen
• -	-

Nederlandse Vereniging voor Hart en Vaat Verpleegkundigen

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Inhoud

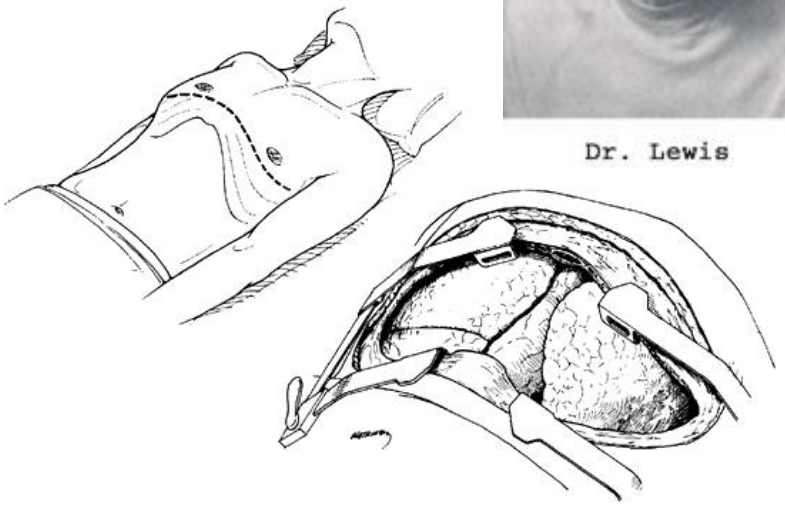
- Inleiding: wat is mediastinitis?
- Welke maatregelen zijn effectief in het voorkomen van mediastinitis?
    - Wat is de rol van lokale antibiotica?
- Wat kunnen we nog verbeteren?
- Conclusie

Inleiding

1952: Eerste hartoperatie op stilstaand hart door Floyd J. Lewis

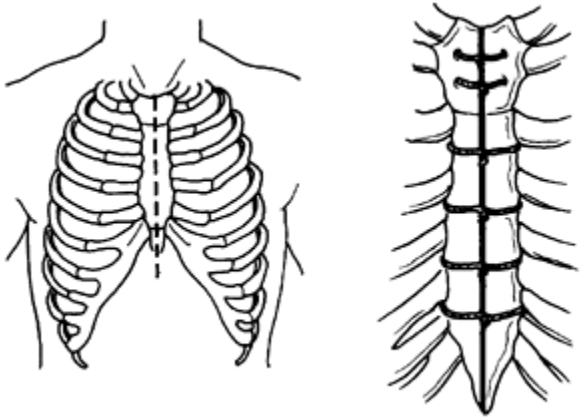
Dr. Lewis

1953: Eerste succesvolle gebruik van de hart-longmachine; snelle groei hartchirurgie



Hartoperaties vonden plaats via ‘clamshell incision’

1957: Mediane sternotomie wordt standaard toegangsweg voor hartchirurgie



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Inleiding

Mediane sternotomie

Voordelen:

-Snelle toegang tot mediastinum

-Goed overzicht van gehele hart en intrathoracale vaten

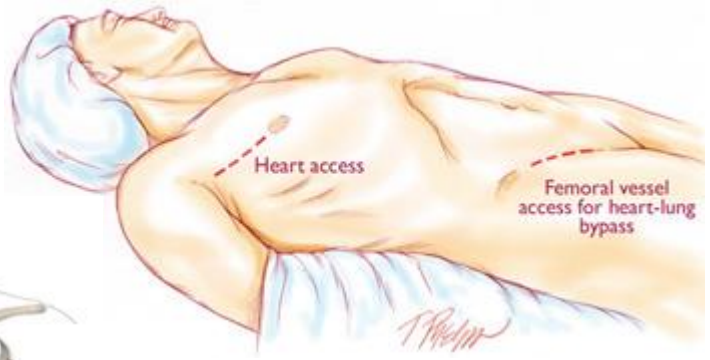
Nadelen:

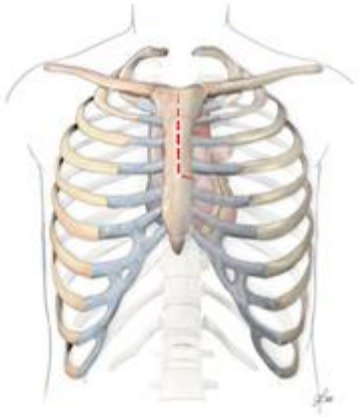
-Kans op sternumdehiscentie

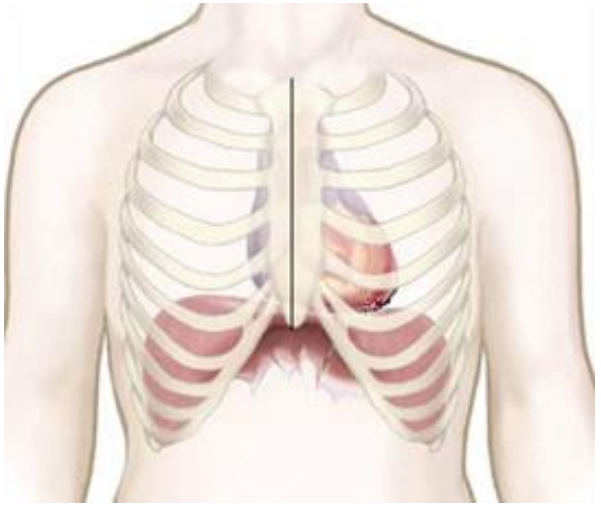
-Kans op wondinfectie, osteomyelitis en mediastinitis

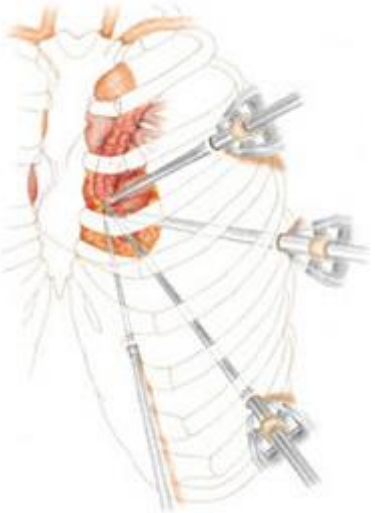
-Ontsierend litteken

Minimaal invasieve chirurgie; slechts een beperkt aantal ingrepen mogelijk







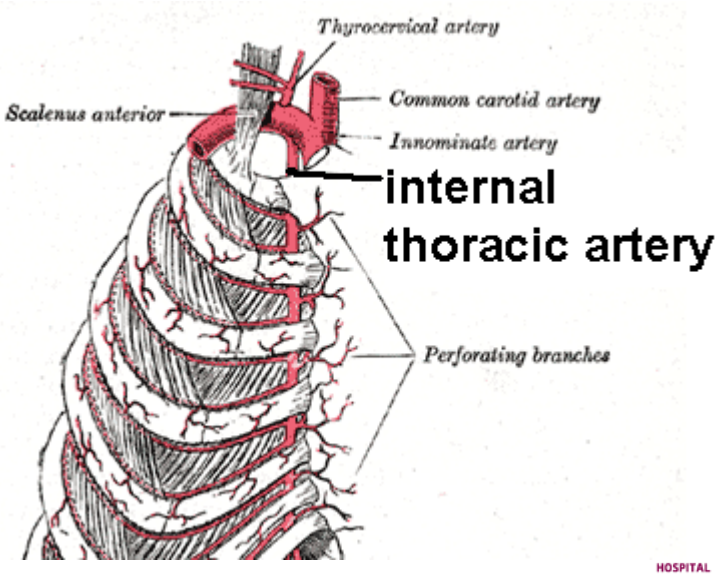


Inleiding

Mediastinitis na openhartchirurgie

Infectie van het mediastinum na mediane sternotomie

- Gemiddeld 14 dagen na mediane sternotomie
- Meest voorkomende pathogenen: S. aureus en CNS
- Belangrijkste risicofactoren:
  - Diabetes Mellitus
  - Nierfalen
  - Roken
  - Obesitas
  - a. Mammaria interna gebruik
  - Reoperatie



Inleiding

Incidentie van mediastinitis in de jaren ‘60/’70: **0.7-1.6%**

Afgelopen decennia veel ontwikkelingen op het gebied van preventie van mediastinitis:

-Verbeterde steriliteit van OK en wondgebied

-Antibioticaprofylaxe

-Perioperatieve behandeling van dragers van *Staphylococcus aureus*

-Nieuwe technieken t.a.v. wondsluiting en wondbehandeling

Huidige incidentie van mediastinitis: **1-3%**

Verklaring: toename hoog risicopatiënten (diabetes, COPD, obesitas, nierfalen etc.)

Richard M. Engelman, David Williams, Thomas H. Gouge, Randolph M. Chase Jr., Emily A. Falk, Arthur D. Boyd, George E. Reed. Mediastinitis Following Open-Heart Surgery Review of Two Years' Experience. Arch Surg. 1973;107:772-778.

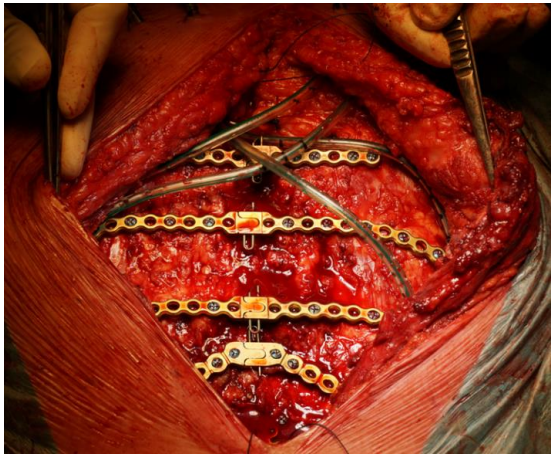
Grmoljez PF, Barner HH, Willman VL, Kaiser GC. Major complications of median sternotomy. Am J Surg. 1975 Dec;130(6):679-81.

Sjögren J, Malmsjö M, Gustafsson R, Ingemansson R. Poststernotomy mediastinitis: a review of conventional surgical treatments, vacuum-assisted closure therapy and presentation of the Lund University Hospital mediastinitis algorithm. Eur J Cardiothorac Surg. 2006;30:898-905.

Inleiding

Consequenties van mediastinitis

- Noodzaak tot opnieuw opereren (vaak meerdere operaties)
- Lange behandelduur met lange ziekenhuisopname
- Verhoogde kans op sterfte (tot 40%)



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Welke maatregelen zijn effectief in het voorkomen van mediastinitis?

CDC 1999 guidelines (laatste update 2017)

Overzicht maatregelen ter voorkoming van postoperatieve wondinfecties

5.1. Recommendations

1. **PREPARATION OF THE PATIENT**
   - **a.** Whenever possible, identify and treat all infections remote to postpone elective operations on patients with remote site infe
   - **b.** Do not remove hair preoperatively unless the hair at or aroun hair removal is necessary, remove immediately before the op
   - **c.** Encourage tobacco cessation for a minimum of at least 30 da
   - **d.** Ensure skin around the incision site is free of gross contamin

2. **HAND/FOREARM ANTISEPSIS FOR SURGICAL TEAM**
   - **a.** Perform preoperative surgical hand/forearm antisepsis accord being used.
   - **b.** See 2002 Guidelines for Hand Hygiene in Healthcare Setting recommendations.[300]

3. **OPERATING ROOM VENTILATION**
   - **a.** Maintain positive pressure ventilation in the operating room a exchanges, airflow patterns, temperature, humidity, location recommendations from the most recen Construction of Hospitals and Outpati

4. **CLEANING AND DISINFECTION OF ENVIRONMENTAL SURFACES**
   - **a.** Do not perform special cleaning or closing of operating rooms after contaminated or dirty operations.

5. **REPROCESSING OF SURGICAL INSTRUMENTS**
   - **a.** Sterilize all surgical instruments according to published guidelines and manufacturer's recommendations.
   - **b.** Immediate-use steam sterilization should never be used for reasons of convenience, as an alternative to purchasing additional instrument sets, or to save time. This practice should be reserved only for patient care items that will be used immediately in emergency situations when no other options are available.
   - **c.** Refer to CDC and HICPAC Guideline for Disinfection and Sterilization in Healthcare Facilities, 2008 for additional recommendations.[68]

6. **SURGICAL ATTIRE AND DRAPES**
   - **a.** Wear a surgical mask that fully covers the mouth and nose when entering the operating room if an operation is about to begin or already under way, or if sterile instruments are exposed. Wear the mask throughout the operation.
   - **b.** Wear a new, disposable, or hospital laundered head covering for each case, when entering the operating room. Ensure it fully covers all hair on the head and all facial hair not covered by the surgical mask.
   - **c.** Wear sterile gloves if serving as a member of the scrubbed surgical team. Put on sterile gloves after donning a sterile gown.
   - **d.** Use surgical gowns and drapes that are effective barriers when wet (i.e., materials that resist liquid penetration).
   - **e.** Change scrub suits that are visibly soiled, contaminated, and/or penetrated by blood or other potentially infectious materials.

7. **STERILE A**
   - **a.** Adhere to principles of sterile technique when performing all invasive surgical procedures.
   - **b.** If drainage is necessary, use a closed suction drain. Place a drain through a separate incision distant from the operative incision. Remove the drain as soon as possible.

8. **POST-OP INCISION CARE**
   - **a.** Protect primarily closed incisions with a sterile dressing for 24-48 hours postoperatively.

Berríos-Torres SI, Umscheid CA, Bratzler DW, et al; Healthcare Infection Control Practices Advisory Committee. Centers for Disease Control and Prevention guideline for the prevention of surgical site infection, 2017. *JAMA Surg*. Published online May 3, 2017.

Welke maatregelen zijn effectief in het voorkomen van mediastinitis?

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Journal of Hospital Infection

journal homepage: www.elsevier.com/locate/jhin

Review

Prevention of deep sternal wound infection in cardiac surgery: a literature review

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[b] Department of Cardiothoracic Surgery, Academic Medical Center, Amsterdam, The Netherlands

Welke maatregelen zijn effectief in het voorkomen van mediastinitis?

Studiemethode

- Literatuurstudie
- RCT's / Preventie van mediastinitis / 1990-2017

- 743 artikelen → 48 resultaten

- Alle resultaten gecategoriseerd op interventie
  - 12 categorieën/interventies

Welke maatregelen zijn effectief in het voorkomen van mediastinitis?

Specifieke maatregelen ter voorkoming van infecties na openhartchirurgie

- Intraveneuze antibioticaprofylaxe ten minste 24h
- Sluiten van het sternum met gekruiste staaldraden
- Achterlaten van lokale antibiotica
- Postoperatief dragen van een korset of vest

Welke maatregelen zijn effectief in het voorkomen van mediastinitis?

Intraveneuze antibioticaprofylaxe

- Eerste generatie cefalosporine (bijv. cefazoline)
- Ten minste 24h

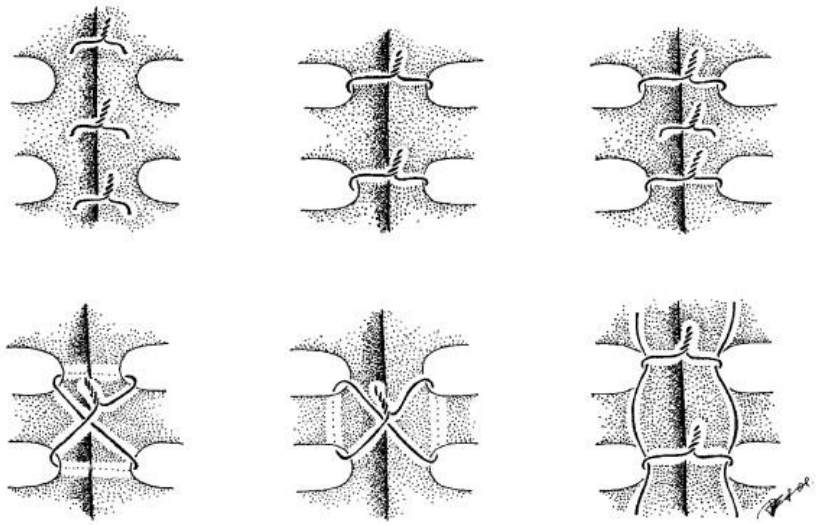
Table I
Trials comparing different durations of antibiotic prophylaxis in cardiac surgery

Author, year	Country	No. of patients	Patient group	Choice of antibiotic	Duration (h)	Outcome measure	Results
Hamouda, 2015 [21]	Germany	615	Cardiac surgery patients	Second-generation cephalosporin	56 vs 32	DSWI	1.4% vs 1.8%, P=0.76
Lin, 2011 [40]	Taiwan	231	CABG patients	First-generation cephalosporin	72 vs 24	DSWI at 30 days	0.9% vs 2.5%, P=0.62
Gupta, 2010 [41]	India	235	CABG and valve surgery patients	Third-generation cephalosporin + aminoglycoside	72 vs 48	DSWI at 30 days	2.78% vs 0.84%, P=0.34
Tamayo, 2008 [42]	Spain	838	CABG, valve surgery and CABG + valve surgery patients	First-generation cephalosporin	24 vs single dose	DSWI (osteomyelitis)	0.5% vs 0.7%, P=0.5 (overall SSI: 1.7% vs 5.0%, P=0.01)

CABG, coronary artery bypass graft; DSWI, deep sternal wound infection; SSI, surgical site infection.

Welke maatregelen zijn effectief in het voorkomen van mediastinitis?

Sluiten van het sternum met gekruiste staaldraden



Welke maatregelen zijn effectief in het voorkomen van mediastinitis?

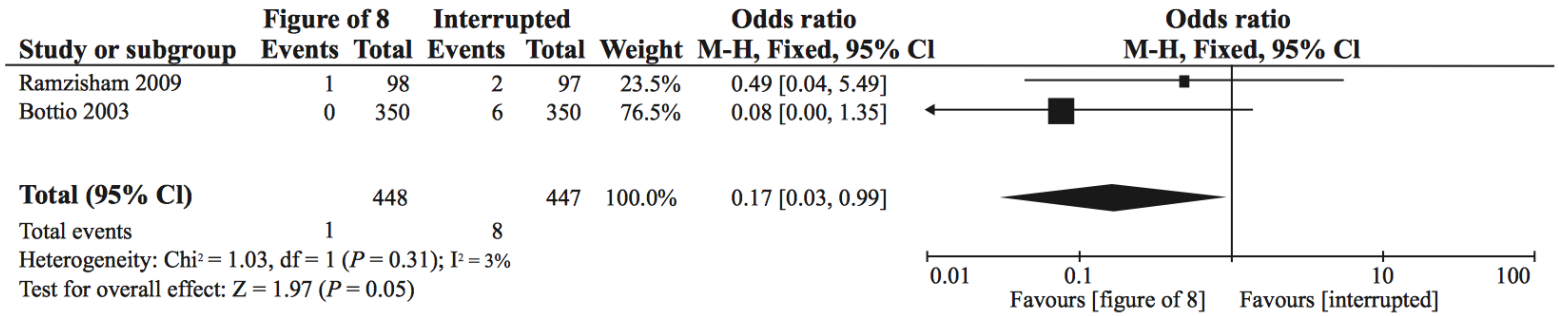


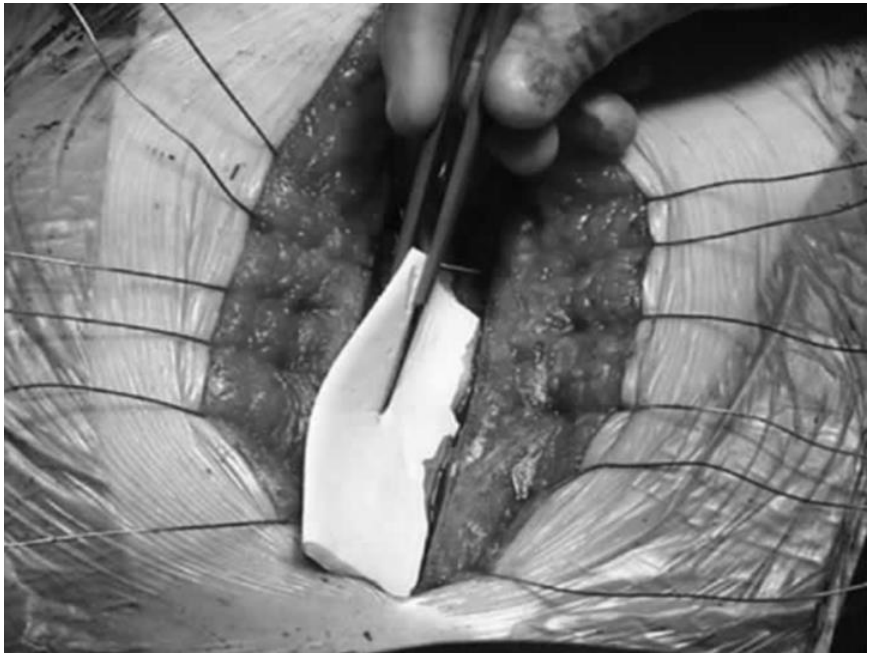
Figure 2. Forest plot of trials comparing figure-of-eight closure with interrupted steel wire closure in the prevention of deep sternal wound infection. CI, confidence interval.

Wat is de rol van lokale antibiotica?

Achterlaten van lokale antibiotica

- Collageen matjes 10x10cm of 5x20cm
- Bevatten 130mg gentamicine per stuk

- Hoge lokale gentamicineconcentraties vanaf 2 uur tot 3 dagen na implanteren
- Hoge lokale concentratie (304mg/L)
- Lage serumconcentratie (2,05mg/L)
- Volledige resorptie



Wat is de rol van lokale antibiotica?

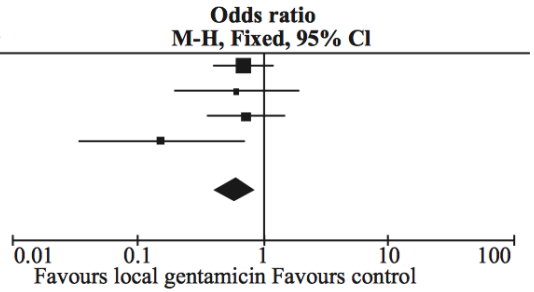
Table II
Trials on local gentamicin in the prevention of deep sternal wound infection (DSWI)

Author, year	Country	No. of patients	Patient group	Product	Outcome measure
Schimmer, 2012 [45]	Germany	720	Cardiac surgery patients	Collagen–gentamicin 110–143 mg	DSWI at 30 days
Bennet, 2010 [46]	USA	1502	Cardiac surgery patients at risk for DSWI (diabetes, obesity)	Collagen–gentamicin 260 mg	DSWI at 90 days
Friberg, 2005 [47]	Sweden	1950	Cardiac surgery patients	Collagen–gentamicin 260 mg	DSWI at 60 days
Eklund, 2005 [48]	Finland	542	CABG patients	Collagen–gentamicin 130 mg	DSWI at 90 days

Wat is de rol van lokale antibiotica?

Study or subgroup	Local gentamicin Events	Total	Control Events	Total	Weight	Odds ratio M-H, Fixed, 95% CI	Year
Friberg *et al*, 2005	23	983	32	967	44.5%	0.70 [0.41, 1.21]	2005
Eklund *et al*, 2005	5	272	8	270	11.1%	0.61 [0.20, 1.90]	2005
Bennett-guerrero *et al*,2010	14	753	19	749	26.4%	0.73 [0.36, 1.46]	2010
Schimmer *et al*, 2012	2	353	13	367	17.9%	0.16 [0.03, 0.69]	2012
Total (95% CI)		2361		2353	100.0%	0.60 [0.41, 0.88]	
Total events	44		72				

Heterogeneity. chi² = 3.74, df = 3 ($P = 0.29$); $I^2 = 20\%$
Test for overall effect: z = 2.64 ($P = 0.008$)



Study or subgroup	Local gentamicin Events	Total	Control Events	Total	Weight	Odds ratio M-H, Fixed, 95% CI	Year
Friberg *et al*, 2005	23	983	32	967	60.5%	0.70 [0.41, 1.21]	2005
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Bennett–guerrero *et al*, 2010	14	753	19	749	0.0%	0.73 [0.36, 1.46]	2010
Schimmer *et al*, 2012	2	353	13	367	24.3%	0.16 [0.03, 0.69]	2012
Total (95% CI)		1608		1604	100.0%	0.55 [0.35, 0.87]	
Total events	30		53				

Heterogeneity. chi² = 3.52, df = 2 ($P = 0.17$); $I^2 = 43\%$
Test for overall effect: z = 2.55 ($P = 0.01$)

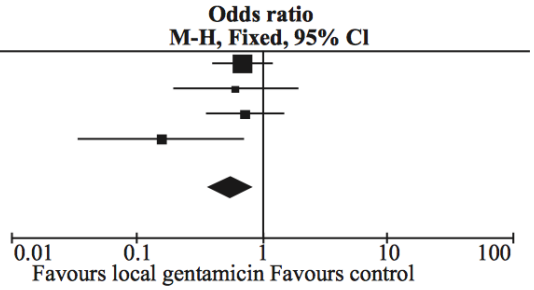
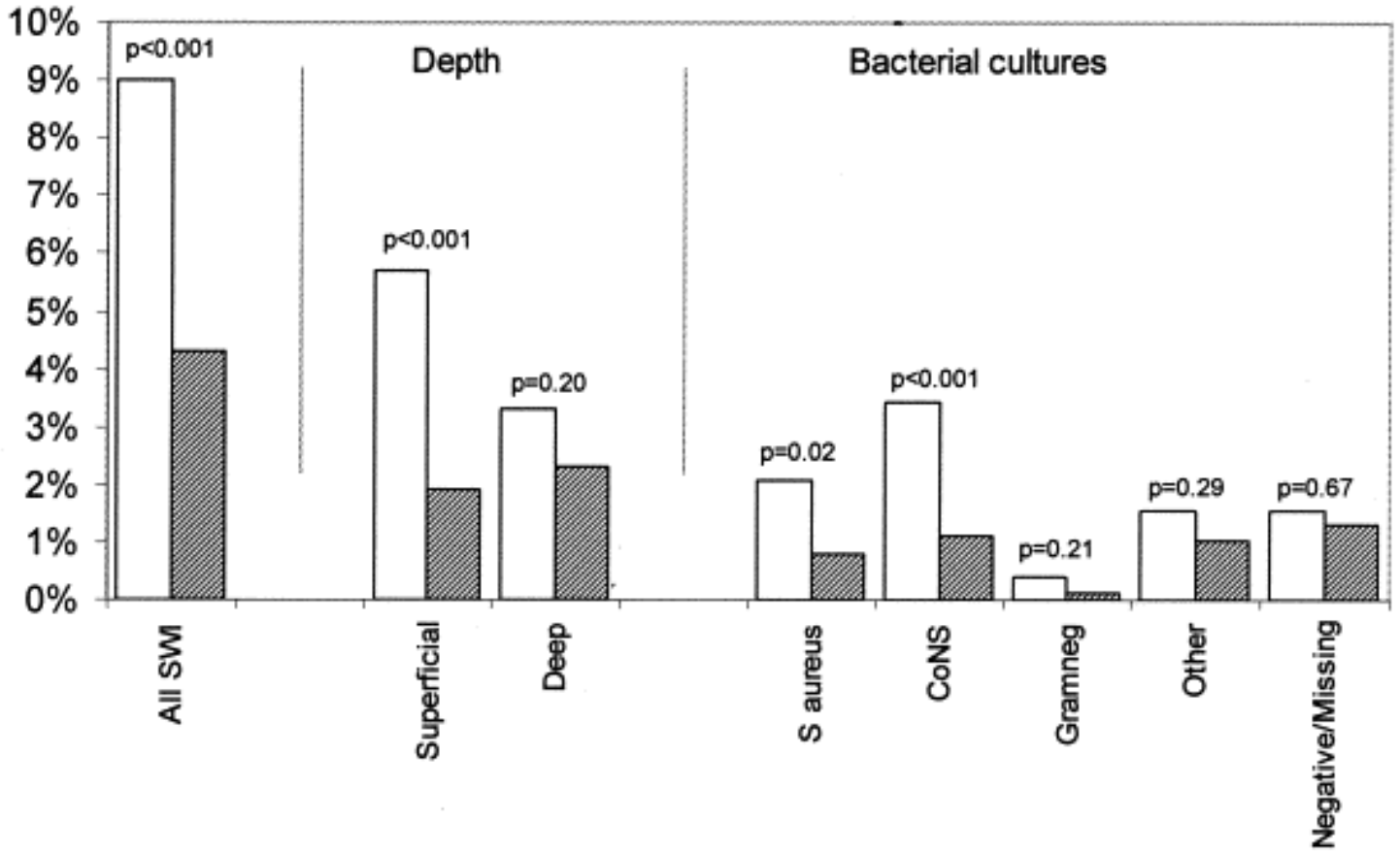


Figure 1. Forest plot of trials done using local gentamicin in the prevention of deep sternal wound infection. CI, confidence interval.

Wat is de rol van lokale antibiotica?



Friberg O et al. Local gentamicin reduces sternal wound infections after cardiac surgery: a randomized controlled trial. Ann Thorac Surg. 2005;79:153-61

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Welke maatregelen zijn effectief in het voorkomen van mediastinitis?

Postoperatief dragen van een korset of vest

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Welke maatregelen zijn effectief in het voorkomen van mediastinitis?

Study or subgroup	Support vest Events	Total	Control Events	Total	Weight	Odds ratio M-H, Fixed, 95% CI
Tewarie 2012	5	380	29	370	50.5%	0.16 [0.06, 0.41]
Gorlitzer 2013	14	1351	27	1188	49.5%	0.45 [0.23, 0.86]
Total (95% CI)		1731		1558	100.0%	0.30 [0.18, 0.51]
Total events	19		56			

Heterogeneity: $Chi^2 = 3.24$, $df = 1$ ($P = 0.07$); $I^2 = 69\%$

Test for overall effect: $Z = 4.46$ ($P < 0.00001$)

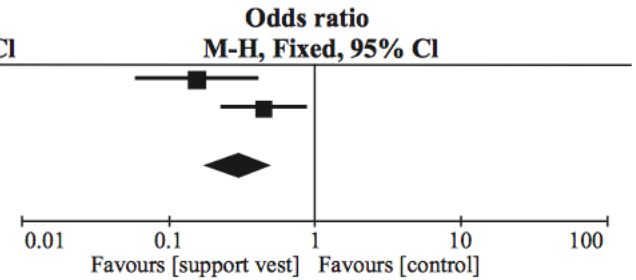

Figure 3. Forest plot of trials on the effect of support vests in the prevention of deep sternal wound infection. CI, confidence interval.

Wat kunnen we nog verbeteren?

Nog steeds zien we 1-3% mediastinitis na hartchirurgie!

- Er zijn veel belangrijke en bewezen effectieve maatregelen die nog niet overal uit worden gevoerd

→ Invoeren van een protocol met maatregelen om mediastinitis te voorkomen

Wat kunnen we nog verbeteren?

Nieuwste ontwikkelingen;

Invoeren van bundels aan maatregelen

→ Afname mediastinitis van 1,9 tot 0,4%

TABLE 1. Specific actions (bundles) implemented to reduce/eliminate surgical site infection

Preoperative
Nasal screening for MRSA
Intranasal mupirocin ointment for MRSA carriers
Intraoperative
Hair clipping immediately before the operation, if necessary
Surgical hand antisepsis: hand rubbing with 0.2% chlorhexidine-alcohol solution
Patient skin preparation: 0.5% chlorhexidine-alcohol solution applied repeatedly 3 to 4 times, as with a lacquer coating, with the last coat applied using sterile gloves. Finally, 10% povidone-iodine applied to the skin using several pieces of cellulose sponge.
Adhesive iodophor-impregnated plastic incise drapes applied to all surfaces of the operative field
Administration of prophylactic antibiotics (1 g CEZ) 30 min before the skin is incised
Readministration of prophylactic antibiotics (1 g CEZ) every 4 h
Discontinuation of prophylactic antibiotics during surgery (intraoperatively only)
Ensure double-gloving for all surgical team members
Scheduled glove change after draping the patient, scratching the bone wax, harvesting the graft, tying the suture of the prosthetic valve, and sternal closure
Check blood glucose levels; if >140 mg/dL, start insulin infusion
No use of intraoperative steroids, with the exception of aortic surgery with circulatory arrest
Irrigate pericardial cavity, sternum, and wound with saline
Sternal closure using at least 6 stainless steel wires
Postoperative
Maintain control of serum blood glucose levels <140 mg/dL
Administer ≥80% inspired oxygen for 2 h
Leave wound primarily covered with gauze occlusive dressing for 2 d
Protect wound with transparent hydrocolloid dressing for the next 5 d

MRSA, Methicillin-resistant *Staphylococcus aureus*; *CEZ*, cefazolin.

K. Miyahara, A. Matsuura, H. Takemura, S. Mizutani, S. Saito, M. ToyamaImplementation of bundled interventions greatly decreases deep sternal wound infection following cardiovascular surgery J Thorac Cardiovasc Surg, 148 (2014), pp. 2381-2388

Wat kunnen we nog verbeteren?

Bewustzijn!

Conclusie

Mediastinitis na hartchirurgie komt weinig voor maar heeft belangrijke consequenties

Er zijn veel verschillende maatregelen om wondinfecties en in het bijzonder mediastinitis na hartchirurgie te voorkomen

Het achterlaten van lokale antibiotica is zeer effectief

Bewustzijn en gezamenlijke inspanningen peri-operatief kunnen mediastinitis na hartchirurgie nog verder terugdringen

a santeon hospital

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