

Effectiveness of intra-operative gentamicin irrigation in reducing post-operative surgical site infections: A systematic review

Supplement 1: Critical appraisal of included studies

Table 1: Critical appraisal of cohort studies using Joanna Briggs Institute cohort study checklist

Study	Q1: Were the two groups similar and recruited from the same population?	Q2: Were the exposures measured similarly to assign people to both exposed and unexposed groups?	Q3: Was the exposure measured in a valid and reliable way?	Q4: Were confounding factors identified?	Q5: Were strategies to deal with confounding factors stated?	Q6: Were the groups/participants free of the outcome at the start of the study (or at the moment of exposure)?	Q7: Were the outcomes measured in a valid and reliable way?	Q8: Was the follow up time reported and sufficient to be long enough for outcomes to occur?	Q9: Was follow-up complete, and if not, were the reasons to loss to follow-up described and explored?	Q10: Were strategies to address incomplete follow-up utilised?	Q11: Was appropriate statistical analysis used?	Score
Bayer et al. ¹	Y	U	U	U	U	Y	Y	Y	Y	N/A	Y	6/11
Fatula et al. ²	Y	Y	Y	Y	Y	Y	Y	U	U	U	Y	8/11
Wang et al. ³	Y	Y	Y	Y	U	U	Y	Y	Y	U	Y	8/11
Yazdi et al. ⁴	Y	Y	Y	Y	U	Y	Y	Y	N	N	Y	8/11
Percentage	100	75	75	75	25	75	100	75	50	0.0	100	

Y = yes, N = no, U = unclear, N/A = not applicable

Table 2: Critical appraisal of randomised controlled trials using Joanna Briggs Institute appraisal tool for randomised controlled trials

Study	Q1: Was true randomisation used for assignment of participants to treatment groups?	Q2: Was allocation to treatment groups concealed?	Q3: Were treatment groups similar at baseline?	Q4: Were participants blind to treatment assignment?	Q5: Were those delivering treatment blind to treatment assignment?	Q6: Were outcome assessors blind to treatment assignment?	Q7: Were treatment groups treated identically other than the intervention of interest?	Q8: Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analysed?	Q9: Were participants analysed in the groups to which they were randomised?	Q10: Were outcomes measured in the same way for treatment groups?	Q11: Were outcomes measured in a reliable way?	Q12: Was appropriate statistical analysis used?	Q13: Was the trial design appropriate, and any deviations from the standard RCT design (individual randomisation, parallel groups) accounted for in the conduct and analysis of the trial?	Score
Emile et al. ⁵	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	12/13
Inojie et al. ⁶	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	13/13
Maaty et al. ⁷	Y	Y	Y	U	N	U	Y	U	Y	Y	Y	Y	Y	9/13
Yazdi et al. ⁸	Y	U	Y	U	U	U	Y	Y	Y	Y	Y	Y	Y	9/13
Percentage	100	75	100	50	25	50	100	75	100	100	100	100	100	

Y = yes, N = no, U = unclear, N/A = not applicable

References (Supplement 1)

- Bayer J, Vackova Z, Svecova H, Stirand P, Spicak J, Martinek J. Gentamicin submucosal lavage during peroral endoscopic myotomy (POEM): A retrospective analysis [Internet]. *Surg Endoscop*. 2018[cited 2024 Jan 26];32(1):300–6. DOI: 10.1007/s00464-017-5677-8
- Fatula LK, Nelson A, Abbad H, Ewing JA, Hancock BH, Cobb WS et al. Antibiotic irrigation of the surgical site decreases incidence of surgical site infection after open ventral hernia repair. *The Am Surg*. 2018;84(7):1146–51.
- Wang J, Yang Y, Lv W, Xu S, Mei S, Shi F et al. Gentamycin irrigation significantly reduces 28-day surgical site infection after emergency neurosurgery. [Internet] *Br J Neurosurg*. 2024[cited 2024 Jan 26];38(2):481–5. DOI: 10.1080/02688697.2021.1902472
- Yazdi H, Gomrokchi AY, Nazarian A, Lechtig A, Hanna P, Ghorbanhoseini M. The effect of gentamycin in the irrigating solution to prevent joint infection after anterior cruciate ligament (ACL) reconstruction. *Arch Bone Jt Surg*. 2019;7(1):67–74.
- Emile SH, Elfallal AH, Abdel-Razik MA, El-Said M, Elshobaky A. A randomized controlled trial on irrigation of open appendectomy wound with gentamicin- saline solution versus saline solution for prevention of surgical site infection [internet]. *Int J Surg*. 2020[cited 2024 Jan 26];81:140–6. DOI: 10.1016/j.ijsu.2020.07.057
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- Maaty AM, Yehia AA, Abdelaleem MM, El-Fattah MA. Subcutaneous antibiotic irrigation to prevent wound infection in obese patients undergoing cesarean section [Internet]. *Women Health Care and Issues*. 2021[cited 2024 Jan 26];4(3):1–5. DOI: 10.31579/2642-9756/060
- Yazdi H, Moradi A, Herbolt M. The effect of gentamicin in irrigating solutions on articular infection prophylaxis during arthroscopic ACL reconstruction [Internet]. *Arch Orthop Trauma Surg*. 2014[cited 2024 Jan 26];134(2):257–61. DOI: 10.1007/s00402-013-1910-7

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Supplement 2: Characteristics of selected studies

Authors (year) Country	Procedure	Study design Setting/context	Participant numbers and characteristics	Risk factors	Groups (sample size)	Outcomes measured	Description of main results
Bayer et al. ¹ (2018) Czech Republic	peroral endoscopic myotomy (POEM)	cohort study IKEM Centre	124 patients with dysphagia: 68.5% had achalasia 89.6% had regurgitation 87.9 % occasional chest pain - Mean age: 46.4 years	Leak during the procedure	Group 1 (n=60): gentamicin lavage (80mg gentamicin in 10 mL NS) Group 2 (n=64): no lavage	- infectious adverse events - length of hospital stay (LOS)	Group 1 had more infectious adverse events than Group 2 (n=1 (2%) compared to n=0 (0%), P=0.48) but this was not statistically significant. Group 1 had longer LOS than Group 2 (2.6 (+/- 1.4) compared to 1.9 (+/-0.8), P<0.01).
Emile et al. ² (2020) Egypt	open appendectomy	RCT General surgery department, Mansoura University Hospital	205 patients with acute appendicitis Age: 16–65 years	Age Diabetes mellitus (DM)	Group 1 (n=69): irrigation with 160 mg gentamicin in 400 ml 0.9% NS Group 2 (n=67): irrigation with 0.9% NS Group 3 (n=69): no irrigation	- SSI incidence - LOS (in days) - wound dehiscence	Groups 1 and 2 had significantly lower rates of incisional SSI than Group 3 (G1: n=3 (4.3%), G2: n=2 (2.9%), G3: n=12 (17.4%), P=0.005). Groups 1 and 2 had similar SSI rates (n=3 (4.3%) and n=2 (2.9%)). There was no significant difference in average LOS between the groups (G1: 1.1(SD 0.26), G2: 1.05(SD 0.24), G3 1.14 (SD 0.3), P=0.18). There was no significant difference in wound dehiscence between the groups (G1: n=0 (0%), G2: n=0 (0%), G3: n=2 (2.8%), P=0.22).
Fatula et al. ³ (2018) United States of America	open ventral hernia repair (OVHR)	cohort study Data from databases of: - Greenville Health System Hernia Center database (2008–2013) - Americas Hernia Society Quality Collaborative (AHSQC) (2013–2017)	822 patients who had OVHR with Mesh Age: - Group 1: 56.5 +/- 12.4 years - Group 2: 56.7 +/- 13.8 years - Group 3: 57.9 +/- 14.0 years	Age Body Mass Index (BMI) >25 DM Smokers	Group 1 (n=260): no antibiotic Irrigation Group 2 (n=263): irrigation with 240 mg gentamicin in 500 mL NS Group 3 (n=299): irrigation with 240 mg gentamicin and 600mg clindamycin in 500 mL NS	- SSI incidence - LOS (in days)	Group 3 had significantly lower SSI incidence than groups 1 and 2 (G1: n=43 (16.54%), G2: n=40 (15.21%), G3: n=16 (5.35%), P>0.001). There was no significant difference in average LOS between the groups (G1: 3 days, G2: 4 days, G3: 4 days, P<0.001).
Inojie et al. ⁴ (2023) Nigeria	neurosurgical spine surgery	RCT Memfys Hospital for Neurosurgery	80 patients who had non-instrumented surgery (Class 1 wounds) Age: 18 years and older	Age BMI >25 DM	Group 1 (n=40): irrigation with 80 mg of IV gentamicin in 1L NS Group 2 (n=40): irrigation with 1L 3.5% diluted PI	- SSI incidence - wound dehiscence	The overall SSI rate was significantly higher in Group 1 than Group 2 (n=7 (17.5%) compared to n=1 (2.5%), P=0.025). SSI was additionally divided into two categories: deep SSI and superficial SSI. The SSI rate was higher in Group 1 than Group 2 for both deep SSI (n=2 (5%) and n=1 (2.5%)) and superficial SSI (n=5 (12.5%) and n=0 (0%)). Wound dehiscence was higher in Group 1 (n=6) than in Group 2 (n=1).

Authors (year) Country	Procedure	Study design Setting/context	Participant numbers and characteristics	Risk factors	Groups (sample size)	Outcomes measured	Description of main results
Maaty et al. ⁵ (2021) Egypt	elective caesarean section (C/S) – primary or repeated	RCT Ain Shams University Maternity Hospital	132 patients Age: 20–35 years BMI: 30–40 kg/m ² Single viable foetus, term pregnancy Hb level: >10 gm%	Obesity	Group 1 (n=66): irrigation with 200ml 0.9% saline Group 2 (n=66): irrigation with 1mg/kg gentamicin in 200ml 0.9% saline	- SSI incidence - LOS	Group 1 had higher SSI incidence than Group 2 but the difference was not statistically significant (n=3 (4.5%) compared to n=2 (3.0%), P=0.999). LOS was shorter in Group 2 than Group 1 but the difference was not statistically significant (1.3 +/- 0.5) compared to 1.4 +/- 0.7, P=0.302).
Wang et al. ⁶ (2021) China	Emergency neurosurgeries such as: - craniotomy - neuro-endoscopic procedures - Burr holes.	cohort study Emergency Centre operating theatre at Shenzhen People's Hospital	444 patients Age: >18 years Not allergic to gentamicin Not pregnant	Age DM	Group 1 (n=265): irrigation with 3L NS Group 2 (n=179): irrigation with 80mg/L gentamicin (240 mg gentamicin in 3L NS)	SSI incidence	Group 1 had higher SSI incidence than Group 2 (n= 22 (8.3%) compared to n=2 (1.1%), P=0.001). The use of gentamicin irrigation reduced SSI incidence in Group 2 by 86.7% compared to the incidence in Group 1.
Yazdi et al. ⁷ (2019) Iran	arthroscopic anterior cruciate ligament (ACL) reconstruction – primary procedure	cohort study Orthopaedic department of Firoozgar Hospital	1464 patients requiring a simultaneous partial meniscectomy No pre-existing infections Mean age: - Group 1: 27.20 years - Group 2: 25.75 years	Age BMI >25	Group 1 (n=177): irrigation with 3L NS Group 2 (n=1287): irrigation with 80mg/L gentamicin (240 mg gentamicin in 3L NS)	- post-operative deep infections - post-operative septic arthritis (SA) - LOS	Group 1 had higher post-operative infection rates than Group 2 n=4 (2.2%) compared to n=3 (0.23%), P<0.05). LOS in Group 1 ranged from 8 to 14 days, and in Group 2 from 13 to 30 days.
Yazdi et al. ⁸ (2014) Iran	arthroscopic ACL reconstruction – primary procedure	RCT Firoozgar Hospital	351 patients requiring a simultaneous partial meniscectomy No skin lesions or pre-existing infection Mean age: - Group 1: 27.2 years - Group 2: 25.9 years	Age BMI >25	Group 1 (n=177): irrigation with 0.9% NS Group 2 (n=174): irrigation with 80mg/L gentamicin (240 mg gentamicin in 3L NS) Age and gender distributions were similar in the two groups.	- post-operative septic arthritis (SA) - LOS	Post-operative SA was higher in Group 1 than in Group 2 but the difference was not statistically significant (n=4 (2.2%) compared to n=1 (0.57%), P=0.4). The LOS in group 1 ranged from 8 to 14 days. The LOS of one patient who developed post-operative deep infection in group 2 was not specified.

References (Supplement 2)

- Bayer J, Vackova Z, Svecova H, Stirand P, Spicak J, Martinek J. Gentamicin submucosal lavage during peroral endoscopic myotomy (POEM): A retrospective analysis [Internet]. *Surg Endoscop*. 2018[cited 2024 Jan 26];32(1):300–6. DOI: 10.1007/s00464-017-5677-8
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Supplement 3: Database logic grids

Table 1: CINHAL

Gentamicin irrigation	Post-operative infections
(MH "Therapeutic Irrigation+" AND MH "Gentamicins+") OR TI ((Lavage* OR wash* OR wash out OR irrigat*) AND (Gentamicin* OR gentamycin*)) OR AB ((Lavage* OR wash* OR wash out OR irrigat*) AND (Gentamicin* OR gentamycin*))	MH "Surgical Wound Infection+" OR TI ("Surgical site infection*" OR "post-operative infection*" OR "postoperative infection*" OR "postoperative wound infection*" OR "post-operative wound infection*") OR AB ("Surgical site infection*" OR "post-operative infection*" OR "postoperative infection*" OR "postoperative wound infection*" OR "post-operative wound infection*")

Table 2: Scopus

Gentamicin irrigation	Surgical site infections
((Lavage* OR wash* OR wash out OR irrigat*) AND (Gentamicin* OR gentamycin*))	"Surgical site infection*" OR "post-operative infection*" OR "postoperative infection*" OR "postoperative wound infection*" OR "post-operative wound infection"

Table 3: PubMed

Gentamicin irrigation	Surgical site infections
((Lavage*[tiab] OR wash*[tiab] OR wash out[tiab] OR irrigat*[tiab]) AND (Gentamicin*[tiab] OR gentamycin*[tiab])) OR ("Therapeutic Irrigation"[mh:noexp] AND "Gentamicins"[mh])	"Surgical Wound Infection"[mh] OR Surgical site infection*[tiab] OR post-operative infection*[tiab] OR postoperative infection*[tiab] OR postoperative wound infection*[tiab] OR post-operative wound infection*[tiab]

Table 4: Embase

Gentamicin irrigation	Surgical site infections
((Lavage* OR wash* OR wash out OR irrigat*) AND (Gentamicin* OR gentamycin*)):ti,ab OR ((lavage.sh OR stomach lavage.sh OR peritoneum lavage.sh) AND Gentamicin.sh)	Surgical infection.sh OR (Surgical site infection* OR post-operative infection* OR postoperative infection* OR postoperative wound infection* OR post-operative wound infection*).ti,ab

Table 5: Medline

Gentamicin irrigation	Surgical site infections
((Lavage*[tiab] OR wash*[tiab] OR wash out[tiab] OR irrigat*[tiab]) AND (Gentamicin*[tiab] OR gentamycin*[tiab])) OR ("Therapeutic Irrigation"[mh:noexp] AND "Gentamicins"[mh])	"Surgical Wound Infection"[mh] OR Surgical site infection*[tiab] OR post-operative infection*[tiab] OR postoperative infection*[tiab] OR postoperative wound infection*[tiab] OR post-operative wound infection*[tiab]