Meta-analysis of Closed Incision Negative Pressure Therapy Versus Standard of Care Over Knee And Hip Arthroplasty Closed Surgical Incisions in the Prevention of Surgical Site Complications

Background

- Closed incision negative pressure therapy (ciNPT)* with foam dressings is an effective method of managing and protecting the postoperative surgical site.
- Previous meta-analyses have shown that ciNPT can be beneficial after orthopedic surgery, including total joint arthroplasty.1-3

Purpose

 This systemic review and meta-analysis examines the impact of ciNPT on the risk of surgical site complications (SSC) following knee and hip arthroplasty.

Methods

- A systemic literature search was performed in PubMed, EMBASE, and QUOSA for publications comparing ciNPT to traditional standard of care (SOC) dressings between January 2005 and July 2021.
- The search identified 972 publications. After removal of duplicates and studies that did not meet the inclusion criteria, 12 were specific to knee and/or hip arthroplasties.
- Analyses were performed by calculating weighted risk ratios. Treatment effects were combined, and a random effects model was used for each analysis.

Results

 Eight studies were included in the evaluation of SSCs, where a significant difference was seen in favor of ciNPT (relative risk [RR] 0.332, p<0.001; Figure 1).

Results (Cont'd)

- 0.399, p=0.003; Figure 5).
- ciNPT and SOC (RR 0.339, p=0.335).
- Figure 6).

Conclusions

- associated prolonged incisional drainage.

References

- 2019;34(11):2804-2814.
- Arthroplasty. 2021;36(7):2402-2411.
- 2020;17(5):1310-1322.

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> Significant benefits in favor of ciNPT were also seen in the analysis of surgical site infection (RR 0.401, p=0.016; Figure 2), seroma (RR 0.473, p=0.008; Figure 3), dehiscence (RR 0.380, p=0.014; Figure 4), and prolonged incisional drainage (RR

 Only two studies reported on hematomas, for which there was no difference between

 In addition to SSCs, health economic endpoints were also evaluated. There was significant reduction in the rate of return to the operating room (RR 0.418, p=0.001;

• For this meta-analysis, the use of ciNPT after knee and hip arthroplasty was with a significantly reduced risk of overall SSC, including surgical site infections, seroma, dehiscence, and

• The risk of returning to the hospital for reoperation was also reduced, suggesting a potential for both economic and clinical advantages for ciNPT over SOC dressings.

1. Kim JH, Kim HJ, Lee DH. J Arthroplasty. 2. Ailaney N, Johns WL, Golladay GJ, et al. J 3. Kim JH, Lee DH. Int Wound J.

Figures

Study name		Statistics for	or each stud	У	SSC / Total		
	Risk ratio	Lower limit	Upper limit	p-Value	PREVENA		
Anatone 2018	0.279	0.139	0.559	0.000	9 / 123	32	
Cooper 2016	0.248	0.063	0.982	0.047	2 / 30	29	
Curley 2018	0.269	0.068	1.058	0.060	2 / 32	3	
Doman 2021	0.429	0.204	0.900	0.025	9 / 130	2	
Higuera-Rueda 2020	0.238	0.092	0.614	0.003	5 / 147	2	
Manoharan 2016	1.714	0.113	25.999	0.698	1 / 21		
Newman 2017	0.426	0.198	0.917	0.029	8 / 79	1	
Redfern 2017	0.278	0.084	0.919	0.036	3 / 196	22	
Overall	0.332	0.236	0.467	0.000			

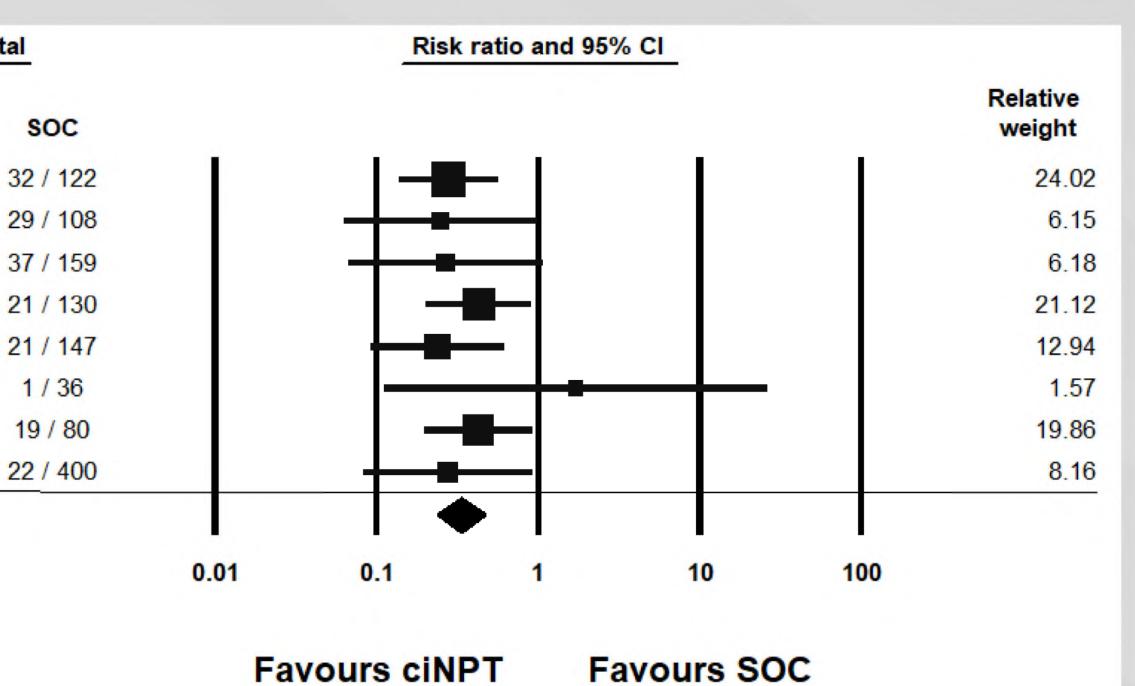
limit, and relative weight.

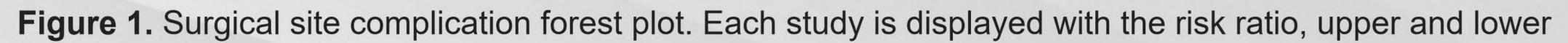
Study name		Statistics f	or each study	<u></u>	SSI / Total		
	Risk ratio	Lower limit	Upper limit	p-Value	PREVENA		
Cooper 2016	0.180	0.025	1.287	0.088	1 / 30	20	
Curley 2018	0.255	0.015	4.277	0.342	0 / 32	9	
Higuera-Rueda 2021	0.333	0.068	1.625	0.174	2 / 147	6	
Newman 2017	0.338	0.014	8.162	0.504	0 / 79		
Redfern 2017	0.292	0.067	1.270	0.101	2 / 196	14	
Tyagi 2019	2.198	0.315	15.344	0.427	2 / 86	2	
Tyagi 2020	0.518	0.055	4.906	0.566	1 / 92	3	
Overall	0.401	0.190	0.844	0.016			

and relative weight.

Study name		Statistics for	or each study		Seroma /	Tot
	Risk ratio	Lower limit	Upper limit	p-Value	PREVENA	
Pachowsky 2012	0.494	0.231	1.055	0.068	4 / 9	
Pauser 2016	0.455	0.196	1.054	0.066	4 / 11	
Redfern 2017	0.407	0.020	8.439	0.561	0 / 196	2
Overall	0.473	0.272	0.824	0.008		

Figure 3. Seroma forest plot. Each study is displayed with the risk ratio, upper and lower limit, and relative weight





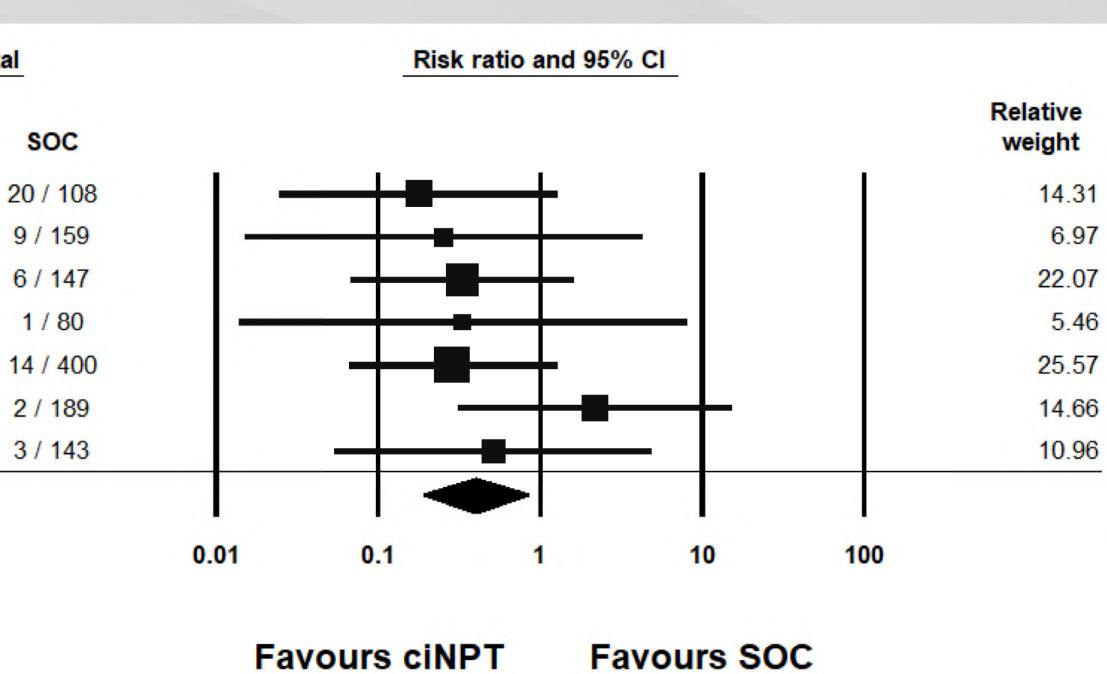
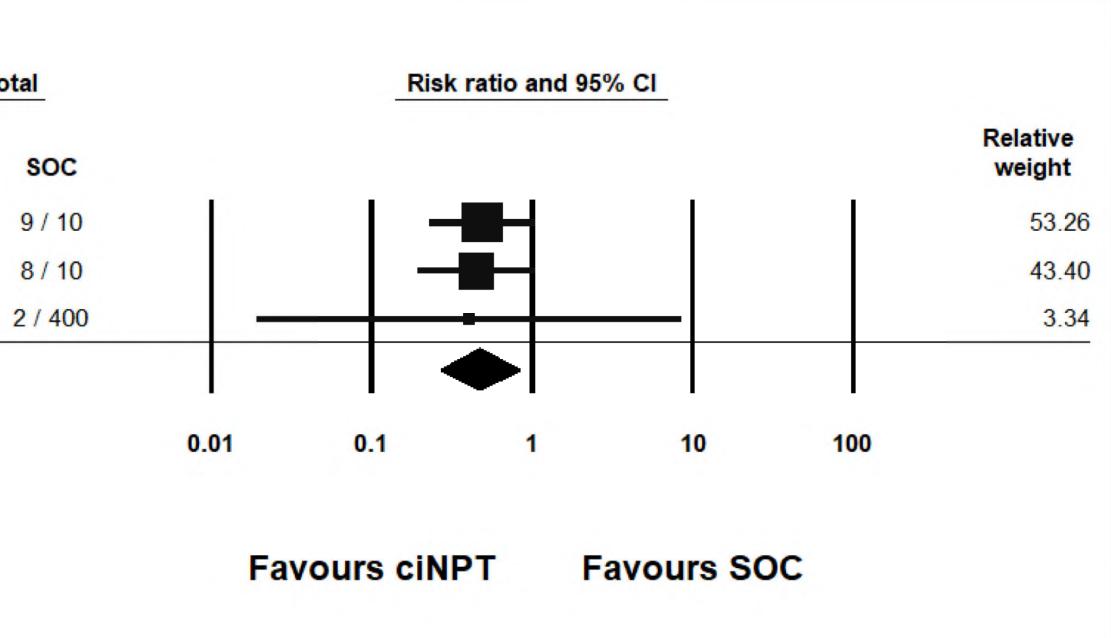


Figure 2. Surgical site infection forest plot. Each study is displayed with the risk ratio, upper and lower limit,



Study name		Statistics fo
	Risk ratio	Lower limit
Cooper 2016	0.343	0.085
Curley 2018	1.616	0.067
Higuera-Rueda 2020	0.200	0.024
Newman 2017	0.253	0.029
Redfern 2017	0.471	0.136
Overall	0.380	0.176

relative weight.

Study name		Statistics for
	Risk ratio	Lower limit
Doman 2021	0.714	0.233
Higuera-Rueda 2020	0.286	0.060
Newman 2017	0.316	0.122
Redfern 2017	0.340	0.077
Overall	0.399	0.218

lower limit, and relative weight.

Study name	Statistics for each study			У	ROR / Total			Risk ratio and 95% CI			
	Risk ratio	Lower limit	Upper limit	p-Value	PREVENA	SOC					Relative weight
Cooper 2016	0.257	0.035	1.877	0.181	1 / 30	14 / 108			<u> </u>		7.1
Curley 2018	0.269	0.068	1.058	0.060	2 / 32	37 / 159					15.0
Doman 2021	1.000	0.206	4.863	1.000	3 / 130	3 / 130			-	-	11.2
Higuera-Rueda 2020	0.250	0.028	2.210	0.212	1 / 147	4 / 147			<u> </u>		5.9
Newman 2017	0.203	0.046	0.895	0.035	2 / 79	10 / 80			_		12.7
Redfern 2017	0.408	0.120	1.393	0.153	3 / 196	15 / 400					18.7
Tyagi 2019	4.395	0.404	47.819	0.224	2 / 86	1 / 189			_		- 4.9
Tyagi 2020	0.444	0.151	1.308	0.141	4 / 92	14 / 143					24.1
Overall	0.418	0.246	0.712	0.001							
							0.01	0.1	1	10	100
							Fa	vours ciNP	T Fa	avours SO	C

Figure 6. Rate of return to the operating room forest plot. Each study is displayed with the risk ratio, upper and lower limit, and relative weight.

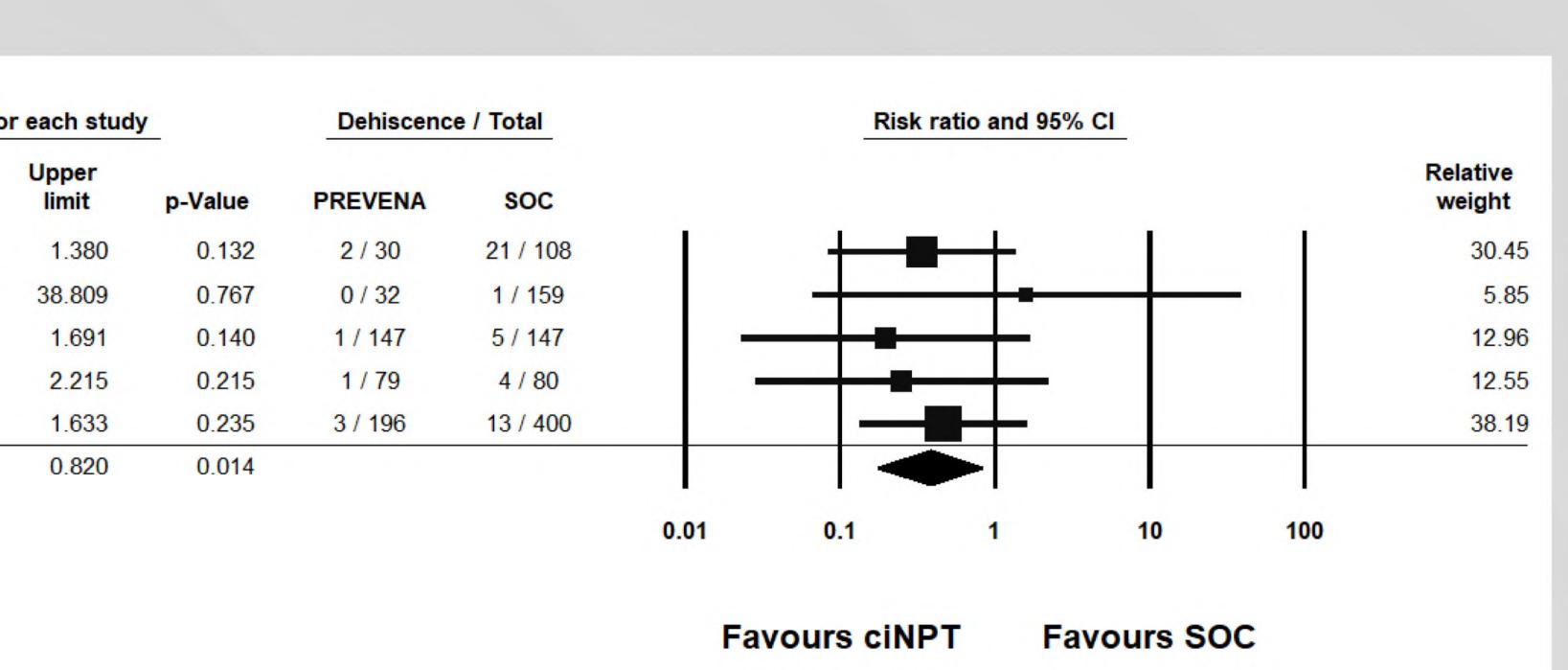


Figure 4. Dehiscence forest plot. Each study is displayed with the risk ratio, upper and lower limit, and

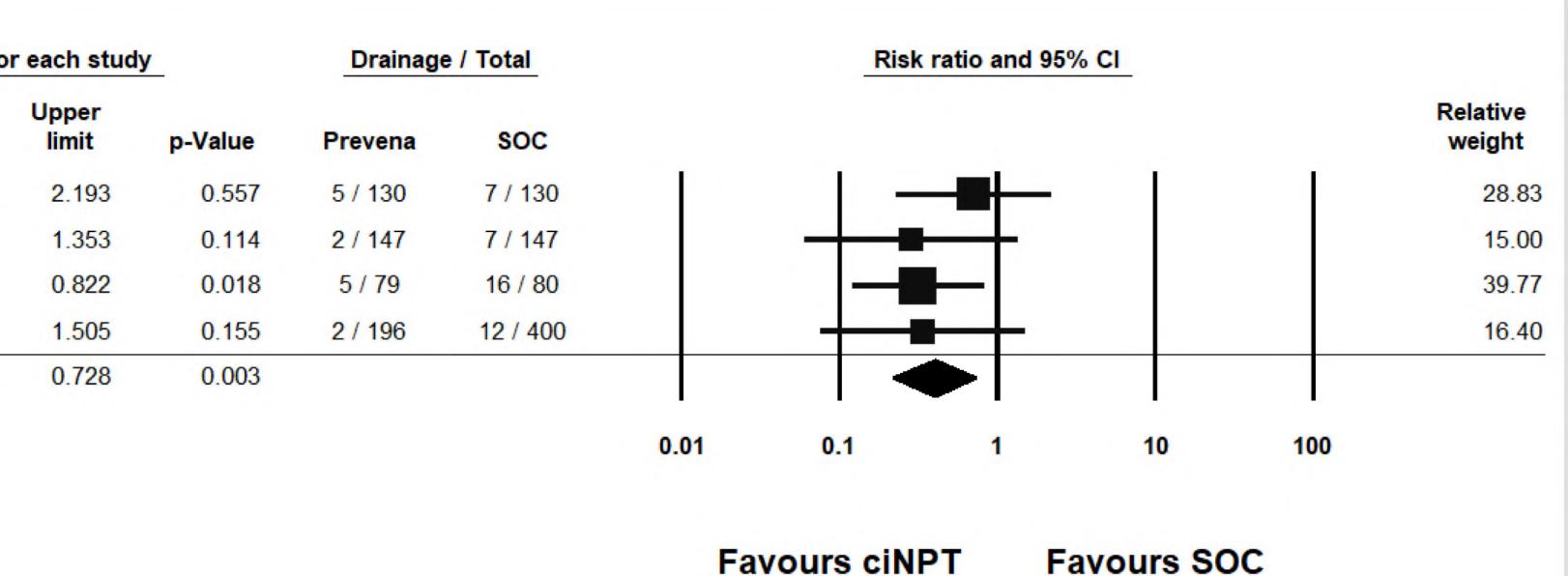


Figure 5. Prolonged incisional drainage forest plot. Each study is displayed with the risk ratio, upper and

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