

Early versus Late Ureteric Stent Removal After Kidney Transplantation – Systematic Review & Meta-analysis

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Background & Aims

- Kidney transplantation is the treatment of choice for patients with end-stage kidney disease.
- In a previous review we concluded routine ureteric stenting in kidney transplantation reduces major urological complications (MUCs).
- Unfortunately, this reduction appears to lead to a concomitant rise in urinary tract infections (UTI). UTI is the commonest post-transplant complication.
- This represents a considerable risk to immunosuppressed recipients.
- There are a number of different approaches taken to ureteric stenting which are associated with varying degrees of morbidity and hospital cost.
- This review aimed to look at the benefits and harms of early versus late removal of the ureteric stent in kidney transplant recipients.

Methods

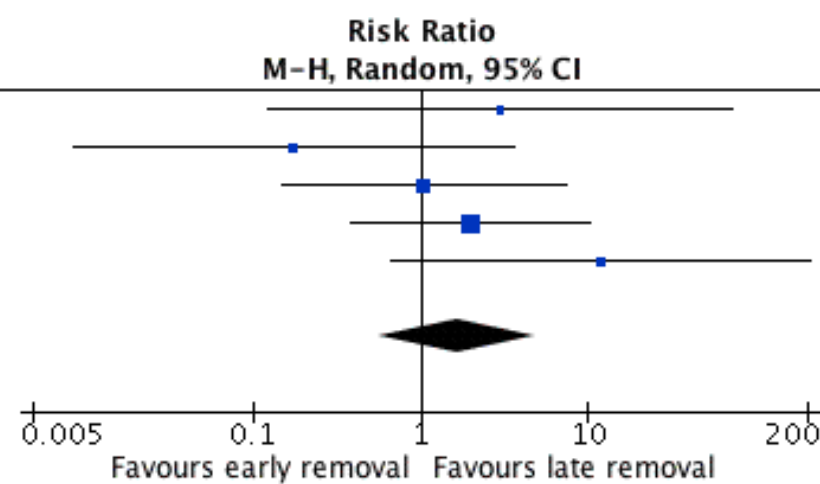
- We searched the Cochrane Kidney and Transplant Specialised Register using terms relevant to this review.
- All RCTs and quasi-RCTs were included in our meta-analysis. Two authors reviewed the identified studies.
- Early removal was considered as stent removal before day 15 post-op or during the index transplant admission.
- The primary outcome of interest was the incidence of MUCs.
 - Secondary outcomes were UTI, idiosyncratic stent-related complications, hospital related costs and adverse events.
- A subgroup analysis was performed examining complications reported in different ureteric stenting techniques; bladder indwelling (BI) vs per-urethral (PU).
- Statistical analyses utilised random effects model and results expressed as relative risk (RR) with 95% confidence intervals (CI).

Results

Study or Subgroup	Early		Late		Weight	Risk Ratio M-H, Random, 95% CI
	Events	Total	Events	Total		
Anil 2012	1	50	0	50	10.9%	3.00 [0.13, 71.92]
Gunawansa 2015	0	203	2	179	11.9%	0.18 [0.01, 3.65]
Huang 2012	2	179	2	186	27.1%	1.04 [0.15, 7.30]
Parapiboon 2012	4	37	2	37	36.9%	2.00 [0.39, 10.26]
TrUST Study 2011	5	85	0	91	13.1%	11.77 [0.66, 209.65]
Total (95% CI)		554		543	100.0%	1.65 [0.57, 4.83]

Total events 12 6
Heterogeneity: Tau² = 0.11; Chi² = 4.31, df = 4 (P = 0.37); I² = 7%
Test for overall effect: Z = 0.92 (P = 0.36)

Figure 1: Forest plot of comparison of the incidence of Major Urological Complications; early vs late removal



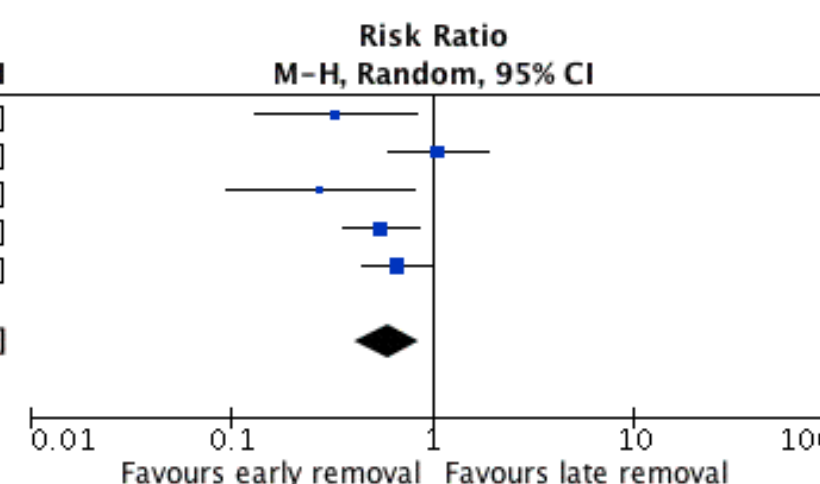
Five RCTs (1097 patients) were included in our analysis.

There was no significant difference in the incidence of MUCs in early vs late removal; RR 1.65 95% CI [0.57, 4.83], p=0.36.

Study or Subgroup	Early		Late		Weight	Risk Ratio M-H, Random, 95% CI
	Events	Total	Events	Total		
Anil 2012	5	50	15	50	11.8%	0.33 [0.13, 0.85]
Gunawansa 2015	23	203	19	179	21.7%	1.07 [0.60, 1.89]
Huang 2012	4	179	15	186	9.4%	0.28 [0.09, 0.82]
Parapiboon 2012	15	37	27	37	27.7%	0.56 [0.36, 0.86]
TrUST Study 2011	25	85	40	91	29.4%	0.67 [0.45, 1.00]
Total (95% CI)		554		543	100.0%	0.60 [0.41, 0.87]

Total events 72 116
Heterogeneity: Tau² = 0.08; Chi² = 7.65, df = 4 (P = 0.11); I² = 48%
Test for overall effect: Z = 2.72 (P = 0.007)

Figure 2: Forest plot of comparison of the incidence of Urinary Tract Infections; early vs late removal



The incidence of UTI was significantly reduced in the early removal group; RR 0.60 95% CI [0.41, 0.87], p=0.007.

UTIs were significantly less likely to occur if a BI stent was used, RR 0.45 95% CI [0.29, 0.70], p=0.0004, compared with PU stents; RR 0.81 95% CI [0.51, 1.27] p=0.36.

Study or Subgroup	Early		Late		Weight	Risk Ratio M-H, Random, 95% CI
	Events	Total	Events	Total		
2.2.1 BI stents						
Anil 2012	5	50	15	50	11.8%	0.33 [0.13, 0.85]
Huang 2012	4	179	15	186	9.4%	0.28 [0.09, 0.82]
Parapiboon 2012	15	37	27	37	27.7%	0.56 [0.36, 0.86]
Subtotal (95% CI)		266		273	48.9%	0.45 [0.29, 0.70]

Total events 24 57
Heterogeneity: Tau² = 0.03; Chi² = 2.31, df = 2 (P = 0.31); I² = 13%
Test for overall effect: Z = 3.56 (P = 0.0004)

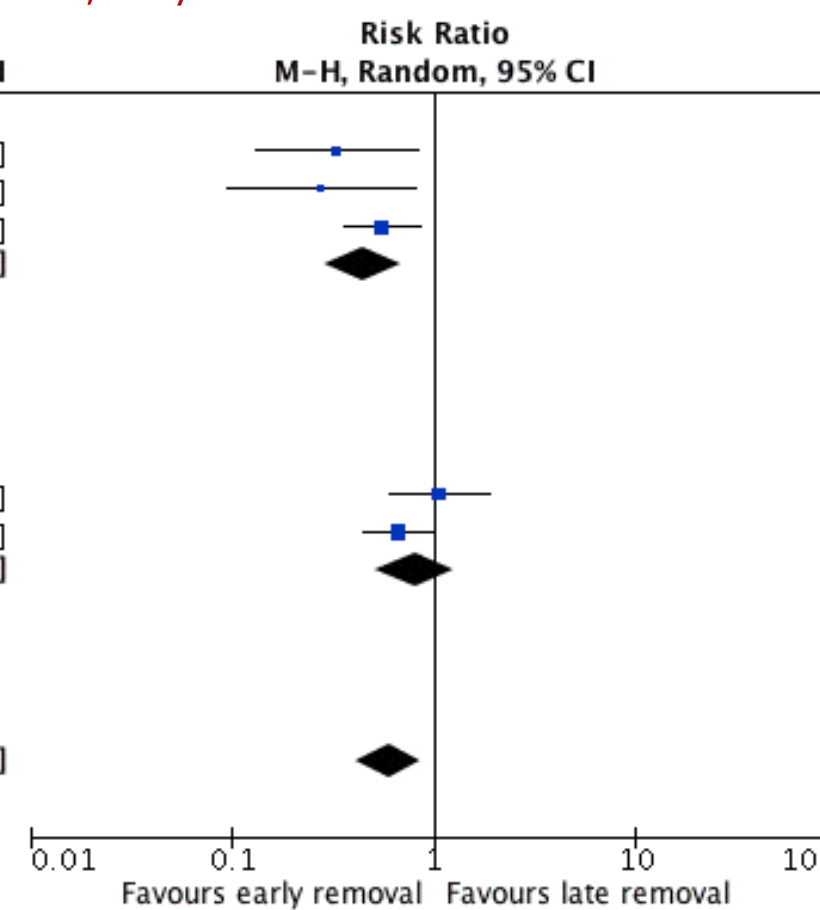
Study or Subgroup	Early		Late		Weight	Risk Ratio M-H, Random, 95% CI
	Events	Total	Events	Total		
2.2.2 PU stents						
Gunawansa 2015	23	203	19	179	21.7%	1.07 [0.60, 1.89]
TrUST Study 2011	25	85	40	91	29.4%	0.67 [0.45, 1.00]
Subtotal (95% CI)		288		270	51.1%	0.81 [0.51, 1.27]

Total events 48 59
Heterogeneity: Tau² = 0.05; Chi² = 1.74, df = 1 (P = 0.19); I² = 43%
Test for overall effect: Z = 0.92 (P = 0.36)

Study or Subgroup	Early		Late		Weight	Risk Ratio M-H, Random, 95% CI
	Events	Total	Events	Total		
Total (95% CI)		554		543	100.0%	0.60 [0.41, 0.87]

Total events 72 116
Heterogeneity: Tau² = 0.08; Chi² = 7.65, df = 4 (P = 0.11); I² = 48%
Test for overall effect: Z = 2.72 (P = 0.007)
Test for subgroup differences: Chi² = 3.24, df = 1 (P = 0.07), I² = 69.2%

Figure 3: Forest plot comparison of the incidence of Urinary Tract Infection; bladder indwelling vs per urethral ureteric stent



The quality of the studies identified for this review were poor. There was a moderate risk of bias inherent in most studies. However they all adequately addressed the research question and utilised a prospective randomised design. Funnel plots did not reveal outlier studies or asymmetry indicating no publication bias.

Data on costs and quality of life outcomes were lacking.

Conclusion

- **Early removal of ureteric stents following kidney transplantation significantly reduces the incidence of UTI and is not associated with a higher risk of MUC.**
- **Bladder indwelling stents are the optimum method for achieving this benefit.**

Acknowledgements

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