Outcomes of ureteroscopy and internal ureteral stent for pregnancy with urolithiasis: a systematic review and meta-analysis

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## Abstract

Objectives To investigate the outcomes of internal ureteral stent versus ureteroscopy for pregnant women with urolithiasis. Data Sources Relevant studies published from January 1980 to April 2020 were identified through a systematic literature search in MEDLINE, EMBASE, Web of Science and Cochrane Library. Study Eligibility Criteria Total of 453 studies were initially identified. Pregnant women in any pregnancy stages who underwent D-J stent insertion only or ureteroscopy operation were included. The number of related participants in each group of study should be more than 10. This systematic review has been registered on PROSPERO (CRD42020195607). Results A total of 25 studies were identified with 131 cases serial stenting and 789 cases URS. The pooled operation success rate was 97% for D-J stent insertion, and 99% for URS. For internal ureteral stent therapy, normal fertility outcome rate was 99%, but the pooled incidence of complications was about 45%. For the URS group, normal fertility outcome rate was 99%, and the pooled incidence of complications was about 1%. However, the pooled premature and abortion incidence rate of two groups were the same as less than 1%, and same in serious complication incidence rate. Conclusions Although internal ureteral stent may cause more slight complications, ureteroscopy operation and internal ureteral stent showed less side effective on fertility results. Evidence suggests that URS therapy have greater advantage for pregnancy with urinary stones when the condition permits. As it is proved safe and effective, internal ureteral stent could be considered at emergency or other special situations.

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Figure 2. Meta-analysis about operation success rate in D-J stent therapy group and URS group.

firstauthor_year	patient	success		ES (95% CI)	% Weight
	size	rate,%	E		
URS			I I		
Ulvik1995	25	.99	<b>♦</b> 0.	99 (0.95, 1.03)	3.64
Scarpa1996	15	.99	<b>→</b> 0.	99 (0.94, 1.04)	2.29
Lemos2002	14	.99	<b>→</b> 0.	99 (0.94, 1.04)	2.15
Rana2009	19	.99	<b>♦</b> 0.	99 (0.95, 1.03)	2.85
Elgamasy2010	15	.99	<b>→</b> 0.	99 (0.94, 1.04)	2.29
Liu2011	24	.99	<b>♦</b> 0.	99 (0.95, 1.03)	3.51
Polat2011	16	.99	<b>♦</b> 0.	99 (0.94, 1.04)	2.43
Atar2012	19	.99	<b>♦</b> 0.	99 (0.95, 1.03)	2.85
Bozkurt2012	32	.99	<b>•</b> 0.	99 (0.96, 1.02)	4.50
Hoscan2012	57	.99	<b>•</b> 0.	99 (0.96, 1.02)	7.17
Johnson2012	46	.99	<b>•</b> 0.	99 (0.96, 1.02)	6.07
Abdel2013	17	.99	<b>→</b> 0.	99 (0.94, 1.04)	2.57
Bozkurt2013	41	.902	<b></b> 0.	90 (0.81, 0.99)	0.74
Song2013	21	.857	<b>→</b> 0.	86 (0.71, 1.01)	0.28
Keshvari2013	44	.99	<b>•</b> 0.	99 (0.96, 1.02)	5.86
Adanur2014	19	.99	<b>♦</b> 0.	99 (0.95, 1.03)	2.85
Georgescu2014	54	.815	<b></b> 0.	81 (0.71, 0.92)	0.58
Teleb2014	21	.99	<b>♦</b> 0.	99 (0.95, 1.03)	3.11
Wang2014	64	.99	<b>•</b> 0.	99 (0.97, 1.01)	7.83
Fathelbab2016	41	.99	<b>•</b> 0.	99 (0.96, 1.02)	5.53
Zhang2016	117	.99	<b>•</b> 0.	99 (0.97, 1.01)	11.76
Abedi2017	45	.99	<b>•</b> 0.	99 (0.96, 1.02)	5.96
Tan2018	23	.87	<b>→</b> 0.	87 (0.73, 1.01)	0.33
Subtotal (I-squared = 0	0.0%, p = 0.572)		0.	99 (0.98, 1.00)	87.15
D-J stent only			1		
Parulkar1998	15	.99		99 (0.94, 1.04)	2.29
Song2013	17	.706		71 (0.49, 0.92)	0.13
Ngai, H. Y2013	30	.99	The state of the s	99 (0.95, 1.03)	4.26
Teleb2014	22	.99		99 (0.95, 1.03)	3.25
Wang2014	17	.99	The state of the s	99 (0.94, 1.04)	2.57
Tan2018	30	.833	4	83 (0.70, 0.97)	0.35
Subtotal (I-squared = 5	56.7%, p = 0.042)		<b>Ç</b> 0.	97 (0.94, 1.01)	12.85
Overall (I-squared = 12.1%, p = 0.280)			0.	99 (0.98, 0.99)	100.00
NOTE: Weights are fro	m random effects a	nalysis			
		I 0	.2 .4 .6 .8 1		

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Figure 3. Meta-analysis about normal fertility outcome in D-J stent therapy group and URS group.

firstauthor_year	patient size	Deliveries normal	ES (95% CI)	% Weight
URS				
Ulvik1995	25	22	0.88 (0.75, 1.01)	0.13
Scarpa1996	15	15	1.00 (0.98, 1.02)	5.49
Lemos2002	14	14	1.00 (0.98, 1.02)	5.49
Elgamasy2010	15	14	0.93 (0.81, 1.06)	0.13
Liu2011	24	22	0.92 (0.81, 1.03)	0.17
Polat2011	16	16	1.00 (0.98, 1.02)	5.49
Atar2012	19	19	1.00 (0.98, 1.02)	5.49
Bozkurt2012	32	32	1.00 (0.98, 1.02)	5.49
Johnson2012	46	44	0.96 (0.90, 1.02)	0.61
Abdel2013	17	17	1.00 (0.98, 1.02)	5.49
Bozkurt2013	41	41	1.00 (0.98, 1.02)	5.49
Song2013	21	21	1.00 (0.98, 1.02)	5.49
Keshvari2013	44	44	1.00 (0.98, 1.02)	5.49
Adanur2014	19	19	1.00 (0.98, 1.02)	5.49
Georgescu2014	54	54	1.00 (0.98, 1.02)	5.49
Teleb2014	21	21	1.00 (0.98, 1.02)	5.49
Wang2014	64	64	1.00 (0.98, 1.02)	5.49
Fathelbab2016	41	41	1.00 (0.98, 1.02)	5.49
Zhang2016	117	117	1.00 (0.98, 1.02)	5.49
Abedi2017	45	45	1.00 (0.98, 1.02)	5.49
Subtotal (I-squared =	0.0%, p = 0.979)		1.00 (0.99, 1.00)	88.85
D-J stent only				
Song2013	17	16	0.94 (0.83, 1.05)	0.17
Teleb2014	22	22	1.00 (0.98, 1.02)	5.49
Wang2014	17	17	1.00 (0.98, 1.02)	5.49
Subtotal (I-squared =	0.0%, p = 0.593)		1.00 (0.99, 1.01)	11.15
Overall (I-squared = 0	0.0%, p = 0.989)		1.00 (0.99, 1.00)	100.00
NOTE: Weights are fro	om random effect	s analysis		
	_	_	blain delivery rate (%)	

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Figure 4. Meta-analysis about adverse pregnant outcome (premature and abortion) in D-J stent therapy group and URS group.

	patient	premature labour			% Weight
firstauthor_year	size	and abortion		ES (95% CI)	
URS					
Ulvik1995	25	1	<b>-</b>	0.04 (-0.04, 0.12)	0.36
Scarpa1996	15	0	÷	0.01 (-0.01, 0.03)	5.47
Lemos2002	14	0	*	0.01 (-0.01, 0.03)	5.47
Elgamasy2010	15	1	<b>!</b>	0.07 (-0.06, 0.19)	0.13
Liu2011	24	1	<b>!</b>	0.04 (-0.04, 0.12)	0.33
Polat2011	16	0	•	0.01 (-0.01, 0.03)	5.47
Atar2012	19	0	•	0.01 (-0.01, 0.03)	5.47
Bozkurt2012	32	0	•	0.01 (-0.01, 0.03)	5.47
Johnson2012	46	2	<b> -</b> -	0.04 (-0.02, 0.10)	0.60
Abdel2013	17	0	•	0.01 (-0.01, 0.03)	5.47
Bozkurt2013	41	0	•	0.01 (-0.01, 0.03)	5.47
Song2013	21	0	•	0.01 (-0.01, 0.03)	5.47
Keshvari2013	44	0	<b>*</b>	0.01 (-0.01, 0.03)	5.47
Adanur2014	19	0	•	0.01 (-0.01, 0.03)	5.47
Georgescu2014	54	0	•	0.01 (-0.01, 0.03)	5.47
Teleb2014	21	0	•	0.01 (-0.01, 0.03)	5.47
Wang2014	64	0	•	0.01 (-0.01, 0.03)	5.47
Fathelbab2016	41	0	•	0.01 (-0.01, 0.03)	5.47
Zhang2016	117	0	•	0.01 (-0.01, 0.03)	5.47
Abedi2017	45	0	*	0.01 (-0.01, 0.03)	5.47
Subtotal (I-squared =	= 0.0%, p = 1.00	10)		0.01 (0.01, 0.02)	88.90
D-J stent only					
Song2013	17	1	<b> -</b> -	0.06 (-0.05, 0.17)	0.17
Teleb2014	22	0	*	0.01 (-0.01, 0.03)	5.47
Wang2014	17	0	•	0.01 (-0.01, 0.03)	5.47
Subtotal (I-squared =	= 0.0%, p = 0.69	7)	)	0.01 (-0.00, 0.02)	11.10
Overall (I-squared = 0.0%, p = 1.000)				0.01 (0.01, 0.02)	100.00
NOTE: Weights are f	rom random effe	ects analysis		T T T	
				ៃ ្ហែ n incidence rate	

Figure 5. Meta-analysis about overall complications in D-J stent therapy group and URS group.

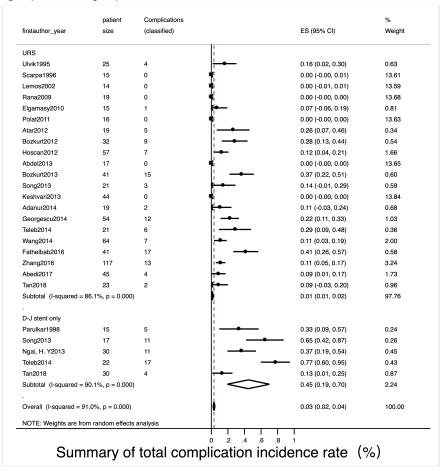
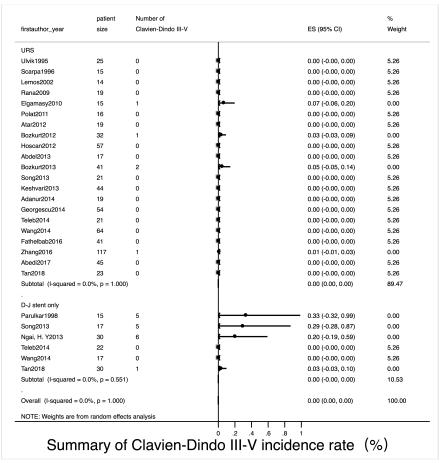


Figure 6. Meta-analysis about Clavien-Dindo III-V complications in D-J stent therapy group and URS group.



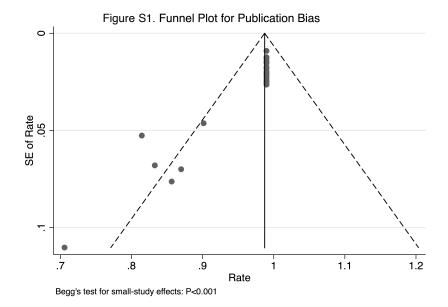


Figure 1. PRISMA flow diagram of study selection for meta-analysis

