KSN 2021
FULLY VIRTUAL MEETING
September 02 (Thu) - 05 (Sun)

Abstract Submission No. : 2070

Procedural success of left atrial appendage occlusion device in patients with chronic kidney disease: A real-world evidence meta-analysis

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Objectives: Percutaneous left atrial appendage occlusion (LAAO) devices are a therapeutic alternative used for theprevention of stroke in patients with atrial ☐brillation (AF). Population with chronic kidney disease(CKD) are at high risk of procedural complications after transcatheter intervention; however, there is nometa-analysis on procedural success in CKD vs. non-CKD population receiving LAAO interventions. To perform a systematic review and meta-analysis of the real-world evidence (RWE) data on the procedure success ofLAAO in CKD population compared to the non-CKD population.

Methods: PubMed, EMBASE, and Cochrane database were searched, from inception to January 2021, for publishedRWE studies reporting the procedural success rate for LAAO device implantation in patients with orwithout CKD. Two researchers independently screened search results and extracted data for studydetails (design, follow-up, assessment etc.), outcome results (procedure success rate), and conclusion.The quality of the included studies was assessed using Newcastle-Ottawa Scale (NOS) and random-effect model was used for meta-analysis.

Results: Of 65 articles identi☐ed, four studies (2 from Germany, 1 from China, and 1 multinational) comprising 678CKD and 978 non-CKD patents receiving LAAO ful☐lled the inclusion criteria. The majority (n= 3) of thestudies were of high quality. CKD was de☐ned as an eGFR <60 ml/min per 1.73 m2 across studies. Threestudies reported procedural success rate as successful implantation and absence of signi☐cant residualleak (≥5 mm). The mean age was above 70 years and Aamplatzer cardiac plug was used in most of theLAAO procedures (68%, n=1122), across studies. The meta-analysis showed a similar procedural successrate for LAAO procedure (CKD=98.4 and non-CKD=96.9) with a pooled risk difference of 0.01 [(95%CI:0.00-0.03), p=0.07].

Conclusions: The procedural success rate of LAAO did not differ between the CKD and non-CKD patients. LAAOdemonstrated similar real-word procedural safety for patients with and without CKD.

Study characteristics

Study	Country	Follow-up	CKD assessment	Gender, (m/f)	Age, mean (SD)	Population		LAAO device
				CKD/non-CKD	*CKD/non-CKD*	*CKD*	*Non-CKD*	
Brockmeyer 2019	Germany	Mar 2012 - Mar 2016	Patients with an eGFR <60 ml/min were assigned to the CKD group.	(42/39)/(42/23)	78.2 (7.3)/74.4 (7.1)	81	65	Amplatzer cardiac plug: 108 Watchman: 9 Amulet: 26
Xue 2018	Germany	Feb 2012 - Jan 2017	CKD was defined as an eGFR < 60 ml/min per 1.73 m²	(92/59)/(111/38)	77.0 (7.2)/73.2 (7.8)	151	149	Watchman: 300
So 2018	China	Jun 2009 - Aug 2017	The presence or absence of CKD based on eGFR cut-off of 60 ml/min using CKD-EPI equation	Overall: 128/68	Overall: 72 (8)	71	125	NR
Kefer 2016	Multinational	Dec 2008 - Nov 2013	CKD was defined as eGFR <60 ml/min per 1.73 m²	(205/169)/(425/215)	77.9 (7.3)/73.1 (8.4)	375	639	Amplatzer cardiac plug: 1014

CKD: Chronic kidney disease; eGFR: Estimated glomerular filtration rate; f: female; LAAO: left atrial appendage occlusion; m: male; NR: not reported

Meta-analysis of the LAAO procedure success in CKD vs non-CKD population

Study or Subgroup	CKD Events	CKD Total	Non-CKD Events	Non-CKD Total	Weight	Risk Difference M-H, Random, 95% CI
Brockmeyer 2019	81	81	63	65	9.2%	0.03 [-0.02, 0.08]
Kefer 2016	149	151	145	149	22.1%	0.01 [-0.02, 0.05]
So 2018	69	71	122	125	10.1%	-0.00 [-0.05, 0.04]
Xue 2018	368	375	618	639	58.6%	0.01 [-0.01, 0.03]
Total (95% CI)		**678**		**978**	**100.0%**	**0.01 [-0.00, 0.03]**
Total events	667		948			

Heterogeneity: Tau² = 0.00; Chi² = 1.03, df = 3 (P = 0.79); I² = 0%
Test for overall effect: Z = 1.81 (P = 0.07)