

Efficacy and Safety of the Push and Pull Method for Treatment of Food Bolus Impaction: A Systematic Review and Meta-Analysis



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INTRODUCTION

- Esophageal food impactions (EFI) contribute significantly to morbidity and health expenditures. Professional recommendations for endoscopic management have advised a pull bolus extraction method, noting a risk of perforation with the alternative push or gastric advancement method. Recent studies have suggested non-inferior safety of the push method compared to traditional piecemeal extraction.

OBJECTIVE

- We sought to systematically compare the rate of significant adverse events of the push and pull techniques for EFI via meta-analysis of currently published literature.

METHODS

- MEDLINE and Embase were searched from inception to September 2021. Studies with over five adult participants that reported endoscopic outcomes for EFI were selected.
- The primary outcomes were success and adverse event rates of endoscopic foreign body removal via the pull vs push method. All outcomes were assessed with odds ratios (OR), pooled event rates (ER), and 95% confidence intervals (CI) using a random-effects model, and groups were compared in a mixed-analysis model, with $p < 0.05$ considered significant.

RESULTS

Table 1 – Demographic Characteristics

First Author, Year	Total n Subjects	Average Age	% Female	Bleeding Total	Aspiration Total	Mortality Total	Success Total	Adverse Event Total
Gretarsdottir, 2014	308	62	35	0	4	0	304/308	5
Melendez-Rosado, 2015	209	61	38	4	1	0		7
Kerlin, 2007	40	54	25	1	0	0	40/40	1
Shafique, 2013	64	50	28	3	0	0	59/64	4
Vicari, 2001	189	60	40	0	0	0	189/189	0
Stadler, 1989	26	60	30	0	0	0	26/26	0
Wu, 2010	74	57	37	13	0	0	74/74	13
Weinstock, 1999	64	68	43	0	0	0	55/64	0
Longstreth, 2001	197	63	35	3	0	0	201/201	3
Sengupta, 2015	173	59	40	1	7	0	151/173	9
Shupack, 2019	645	58.4	38.4	36	5	0	417/417	42
Krill, 2020	110	55.2	29	11	2	1	108/110	17
Gurala, 2019	174	61.4	41.3	2	0	0	165/174	5
McMahon, 2018	189	55	39	0	0	0	117/119	1
Stachwell, 2017	255	51	26	0	0	0	255/255	2
Haas, 2016	470	56.7	36	0	1	2	469/470	3
Cavaliere, 2019	109	58.5	39.6	0	0	0		0

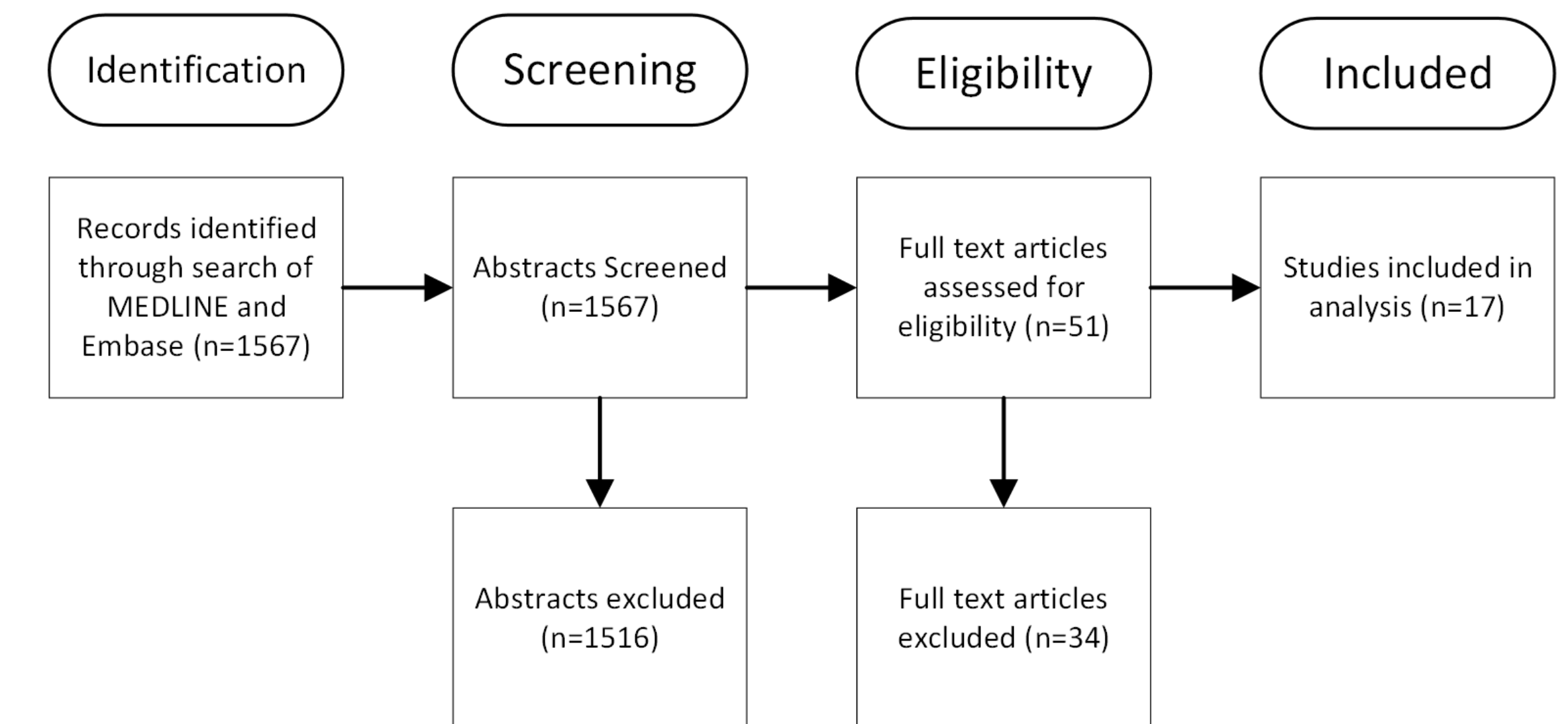
Table 2 – Event Rates by Subgroup

Outcome	Event Rate	95% CI	No. of Studies (No. of Patients)	I ²	p-value
Success, push	0.993	(0.982-0.997)	7 (1479)	81.151	0.185
Success, pull	0.86	(0.749-0.927)	7 (1479)	81.151	0.185
Perforation, push	0.012	(0.007-0.023)	11 (2127)	0	0.507
Perforation, pull	0.009	(0.004-0.019)	11 (2127)	0	0.507
Bleeding, push	0.057	(0.040-0.079)	10 (1686)	63.013	0.949
Bleeding, pull	0.039	(0.024-0.062)	10 (1686)	63.013	0.949
Aspiration, push	0.014	(0.008-0.025)	10 (1915)	0	0.536
Aspiration, pull	0.024	(0.013-0.042)	10 (1915)	0	0.536
Adverse events, push	0.058	(0.044-0.076)	14 (2908)	57.927	0.798
Adverse events, pull	0.046	(0.032-0.067)	14 (2908)	57.927	0.798

Table 3 – Odds Ratio

Outcome	Odds Ratio	95% CI	No. of Studies (No. of Patients)	I ²	p-value
Perforation, fixed	2.885	(0.673-12.357)	4 (1382)	0	0.154
Bleeding, fixed	1.423	(0.737-2.793)	4 (1189)	0	0.288
Aspiration, fixed	0.804	(0.273-2.365)	3 (1126)	0	0.692
Total adverse events, fixed	1.407	(0.818-2.420)	6 (1752)	0	0.218

PRISMA Flow Diagram of Literature Search Results



CONCLUSIONS

- Endoscopic therapy for relieving EFI is effective with low rates of adverse events overall. Based on limited data available, there was a trend for increased success rates with the push technique, and a trend for lower adverse events with the pull method.
- To our knowledge, this is the first meta-analysis to demonstrate that the push method for treatment of EFI is non-inferior to the pull method with respect to both success rates and safety profile.