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Introduction

- Encephaloceles: serious, rare skull base defects with herniation of dura, cerebrospinal fluid (CSF), and/or brain tissue^{1,2}
- May present with CSF rhinorrhea, meningitis, nasal obstruction, respiratory distress
- Endoscopic endonasal repair has emerged as an alternative to craniotomy—reduced morbidity^{3,4}

Objectives

1. Describe the landscape of endoscopic endonasal encephalocele repair in children
2. Describe the incidence of common intra- and post-operative complications

Methods

SYSTEMATIC REVIEW:

- 3 databases: MEDLINE, EMBASE, CENTRAL
- Grey literature sources
- Inclusion criteria: all articles discussing endoscopic endonasal encephalocele repair in patients ages 0-18 years
- Exclusion criteria: reviews, meta-analyses, letters
- Primary outcomes: intraoperative and postoperative CSF leak, recurrence, revision surgery

QUALITY ASSESSMENT:

- Cohort studies: Newcastle-Ottawa Scale⁵
- Case studies/series: ROBIN-I⁶, NIH quality tool⁷

STATISTICAL ANALYSIS:

- Chi sq/Fisher statistics for categorical variables

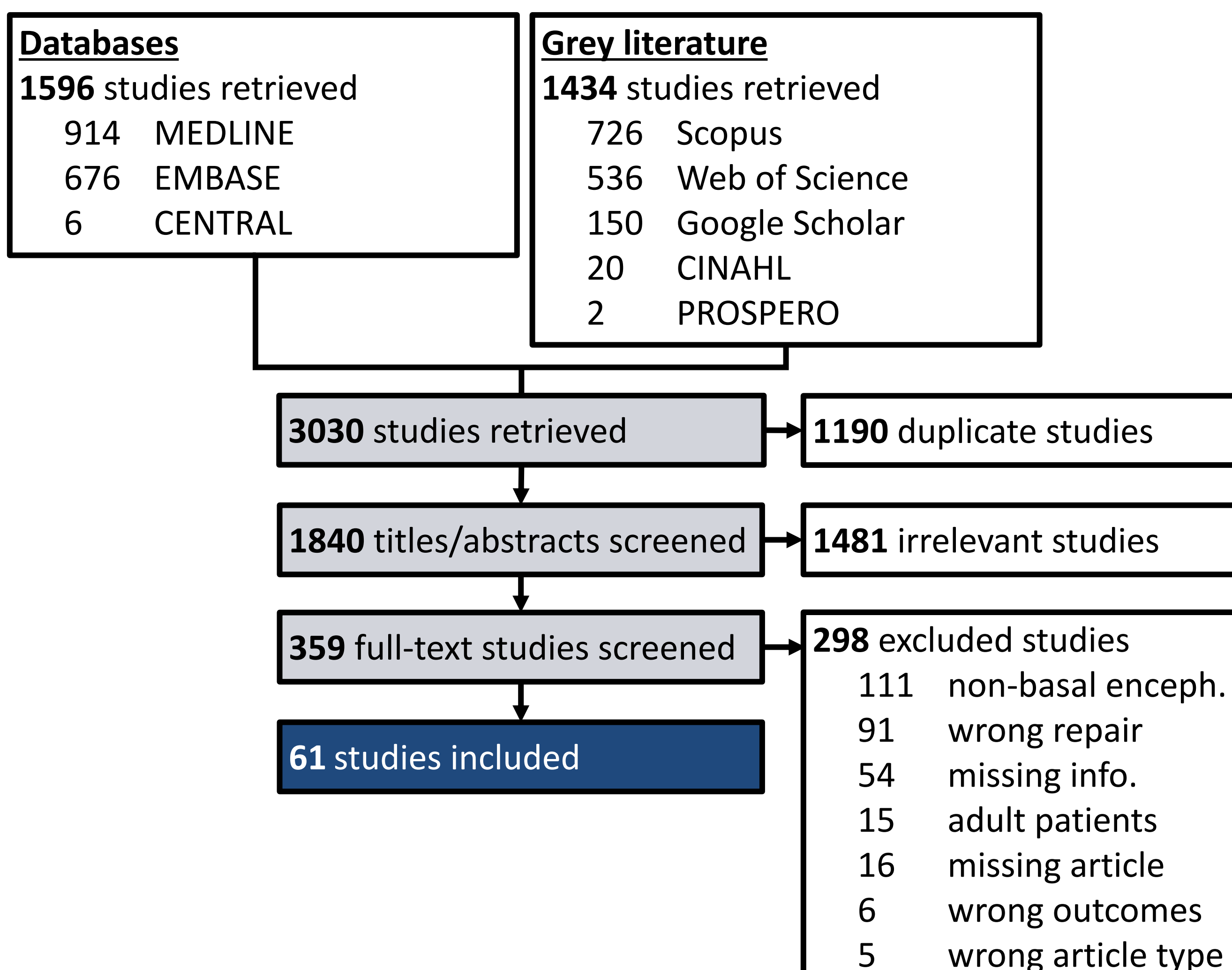


Figure 1. PRISMA⁸ flow diagram.

Results

Table 1. Baseline patient demographics (n = 217)

Median age (range, n = 210)	4.0 years (0–18.0 years)
Sex (% n = 151)	
Male	76 (50.3%)
Female	75 (49.7%)
Diagnosis (% n = 217)	
Meningoencephalocele	121 (55.8%)
Encephalocele	65 (30.0%)
Meningocele	31 (14.3%)
Etiology (% n = 156)	
Congenital	130 (83.3%)
Traumatic	18 (11.5%)
Iatrogenic	6 (3.8%)
Idiopathic	1 (0.6%)
Defect location (% n = 195)	
Transethmoidal	156 (80.0%)
Transsphenoidal	39 (20.0%)
Clinical presentation (%)	
Nasal obstruction (n = 126)	95 (75.4%)
CSF rhinorrhea (n = 109)	74 (67.8%)
Meningitis (n = 91)	59 (64.8%)
Median follow-up (range, n = 149)	18 mo. (1-108 mo.)

Figure 2. Repair types reported during endoscopic endonasal repair in children aged 0-18 years (n = 202)

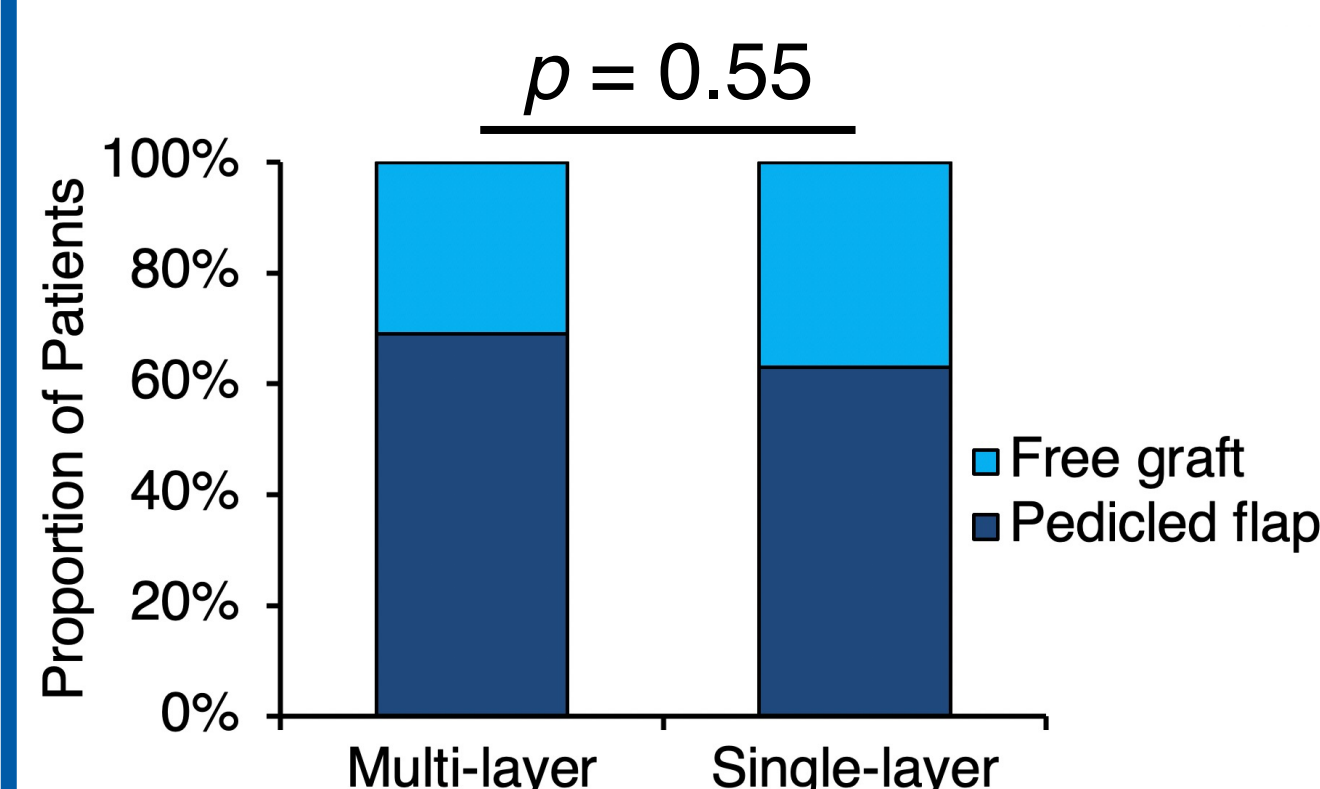
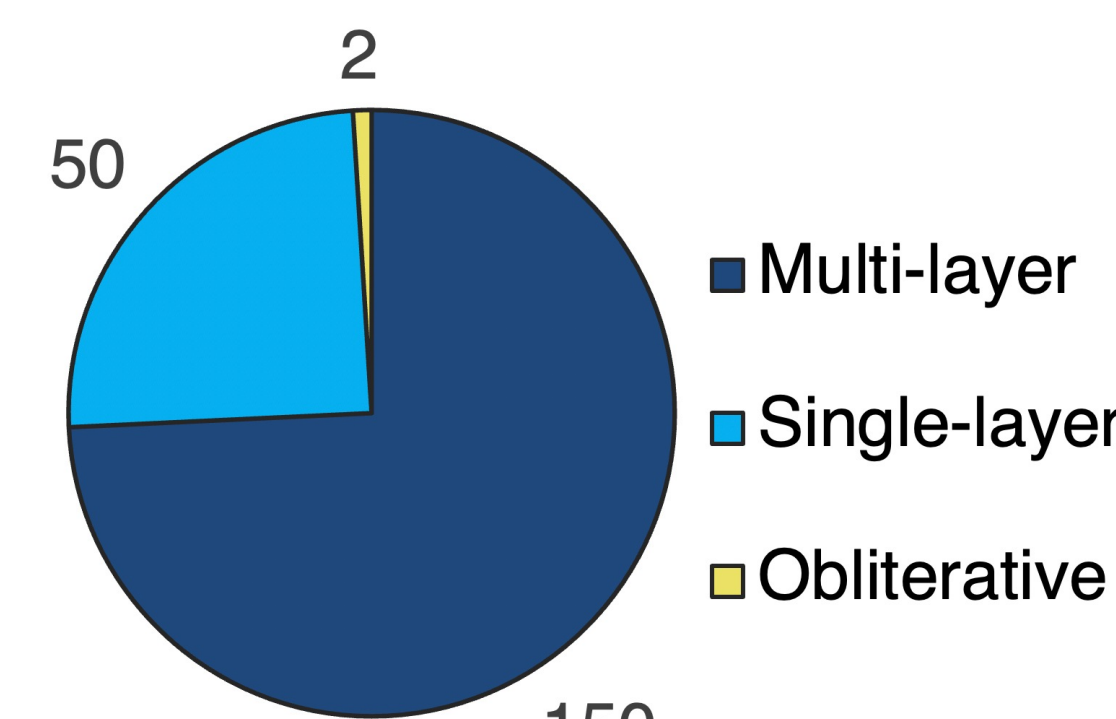


Figure 3. Mucosal overlay approach by repair type (n = 124)

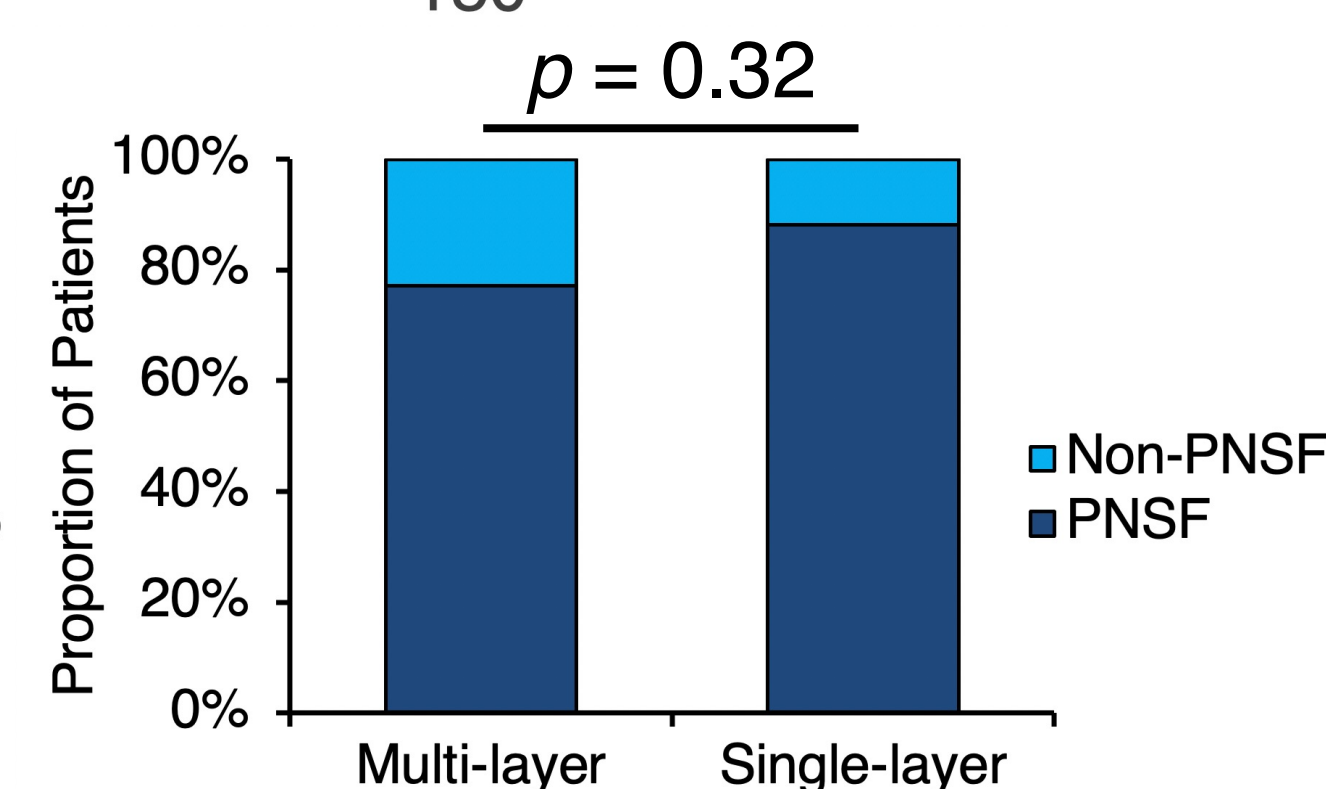


Figure 4. Pedicled flap type by repair type (n = 74). PNSF = pedicled nasoseptal flap

Table 2. Patient outcomes

Intraoperative CSF leak (n = 64)	16 (25.0%)
Postoperative CSF leak (n = 154)	5 (3.2%)
Encephalocele recurrence (n = 180)	10 (5.6%)
Revision surgery (n = 64)	6 (9.4%)

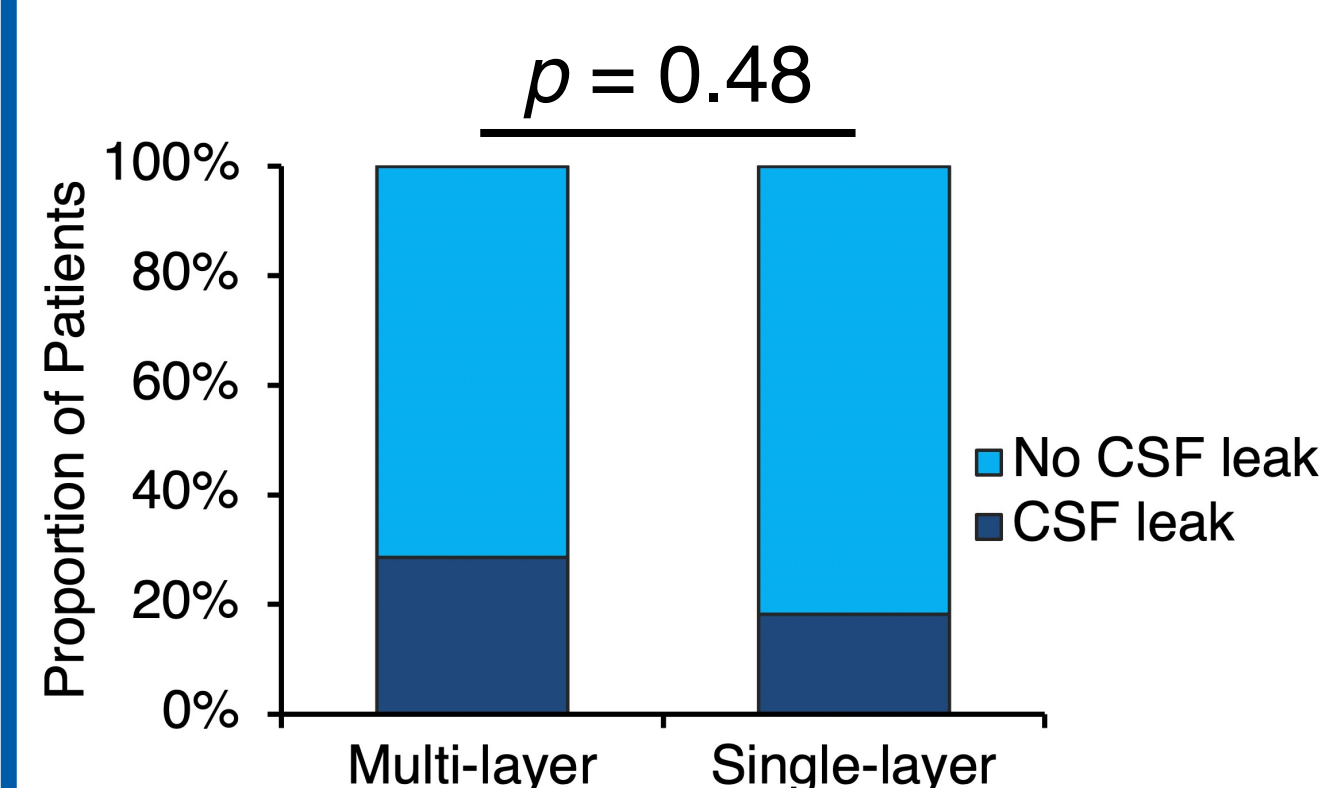


Figure 5. Intraoperative CSF leak by repair type (n = 60)

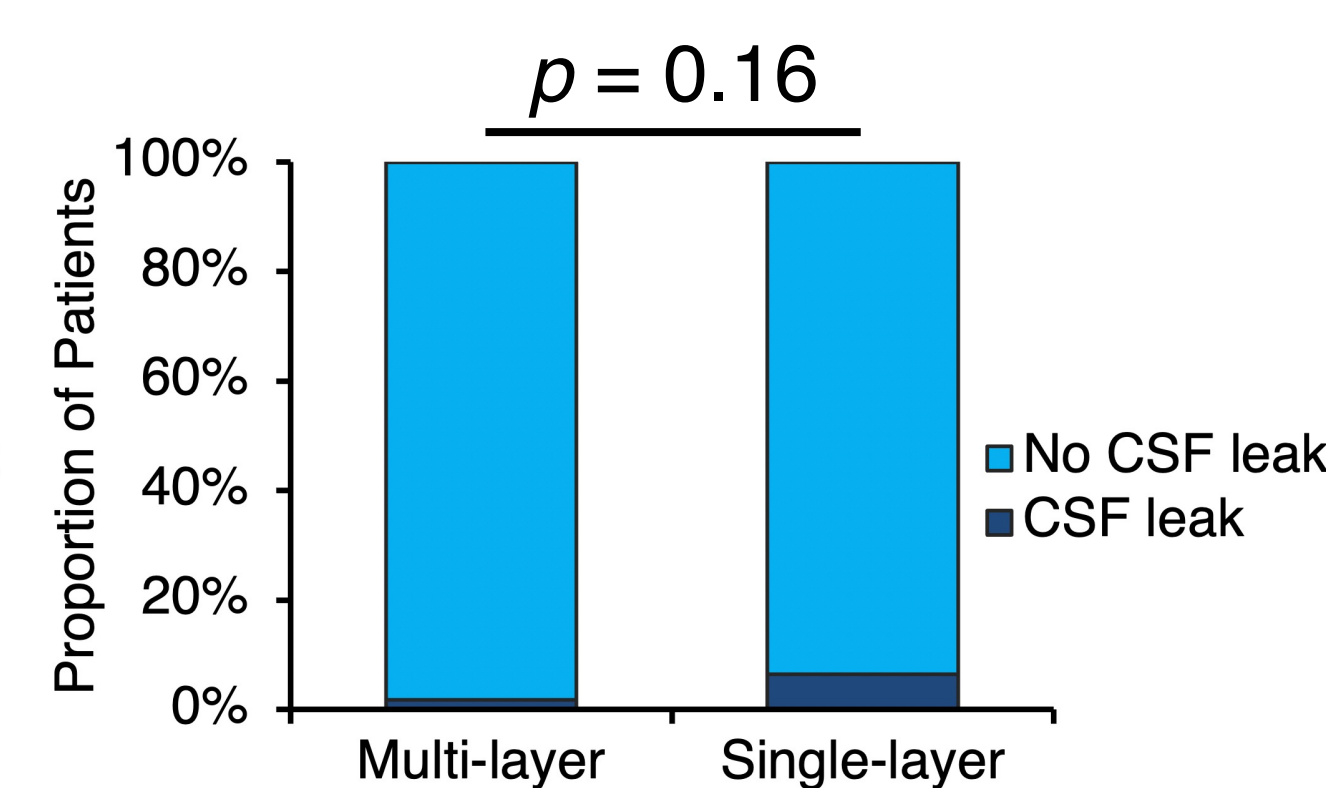


Figure 6. Postoperative CSF leak by repair type (n = 143)

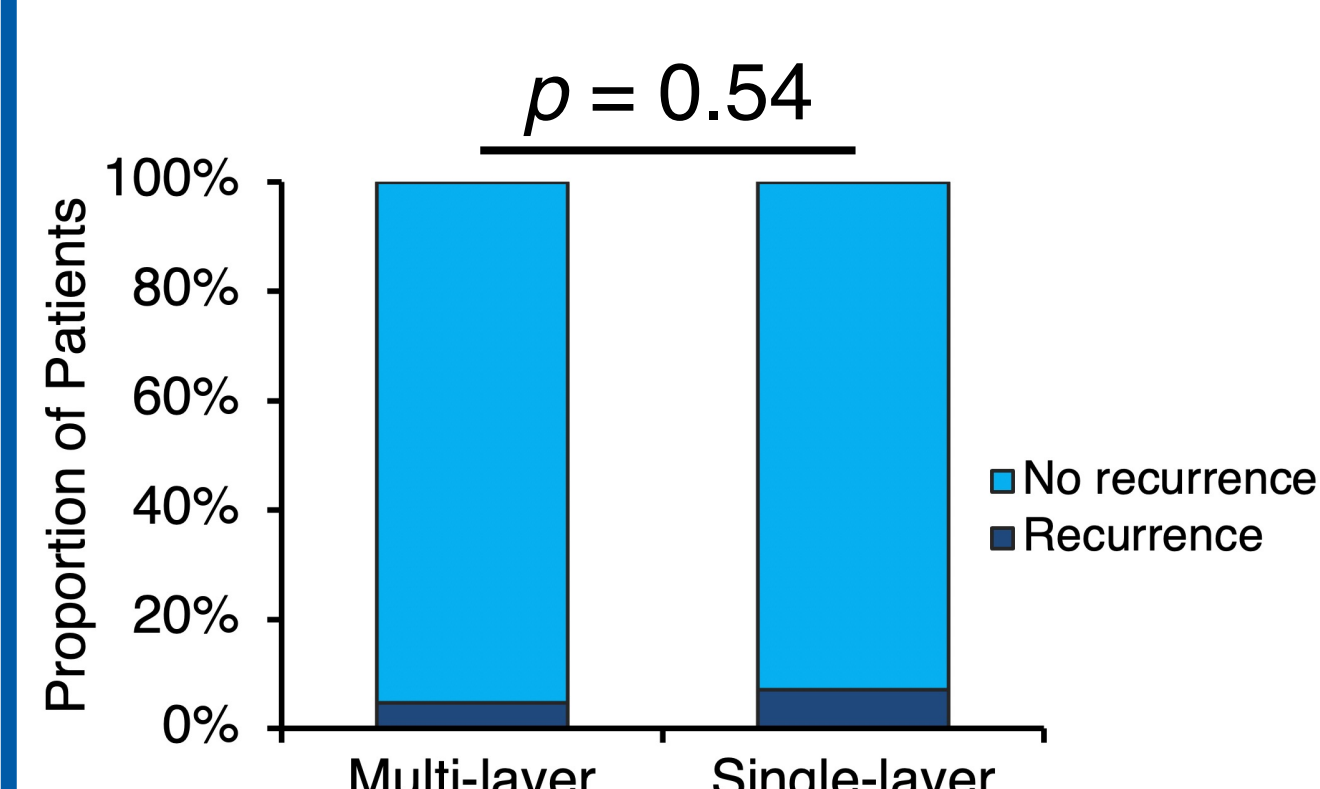


Figure 7. Recurrence by repair type (n = 170)

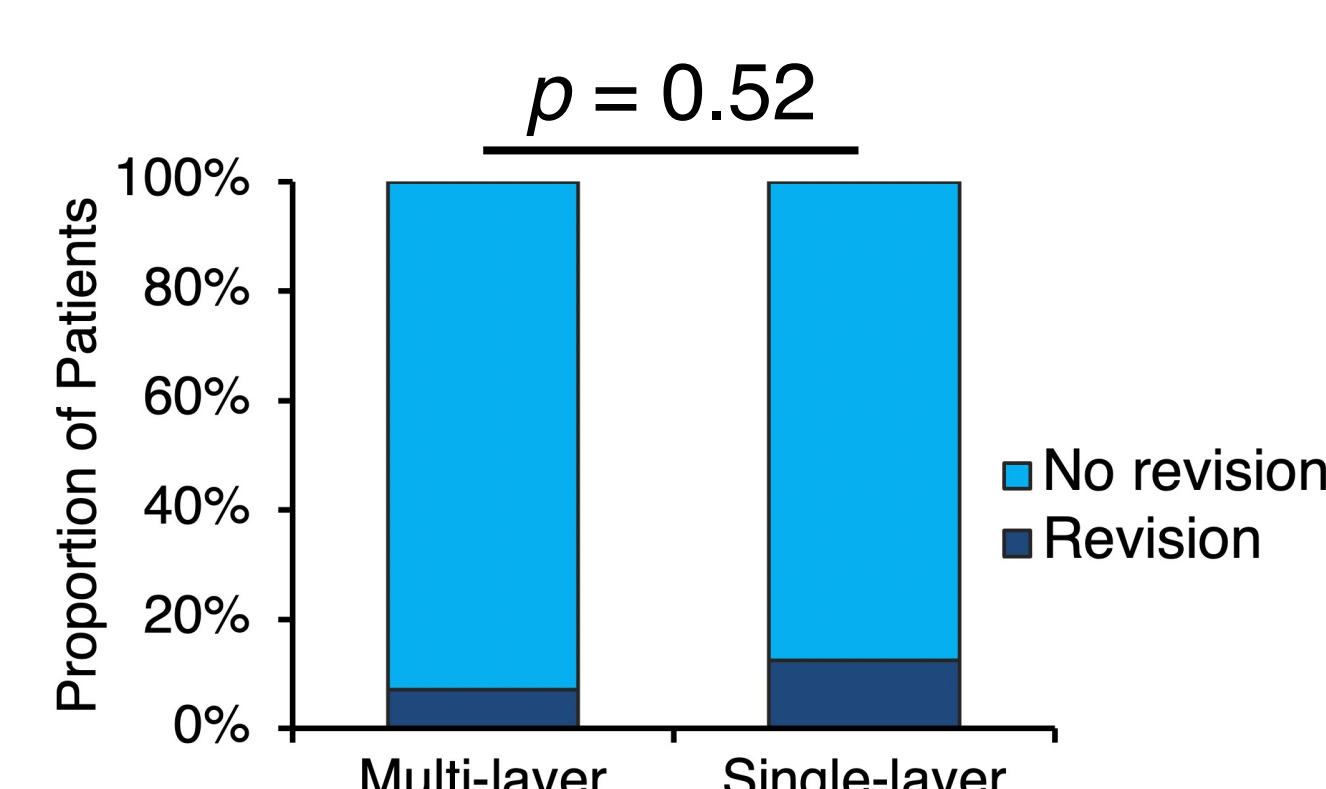


Figure 8. Revision surgery by repair type (n = 58)

Results (cont'd)

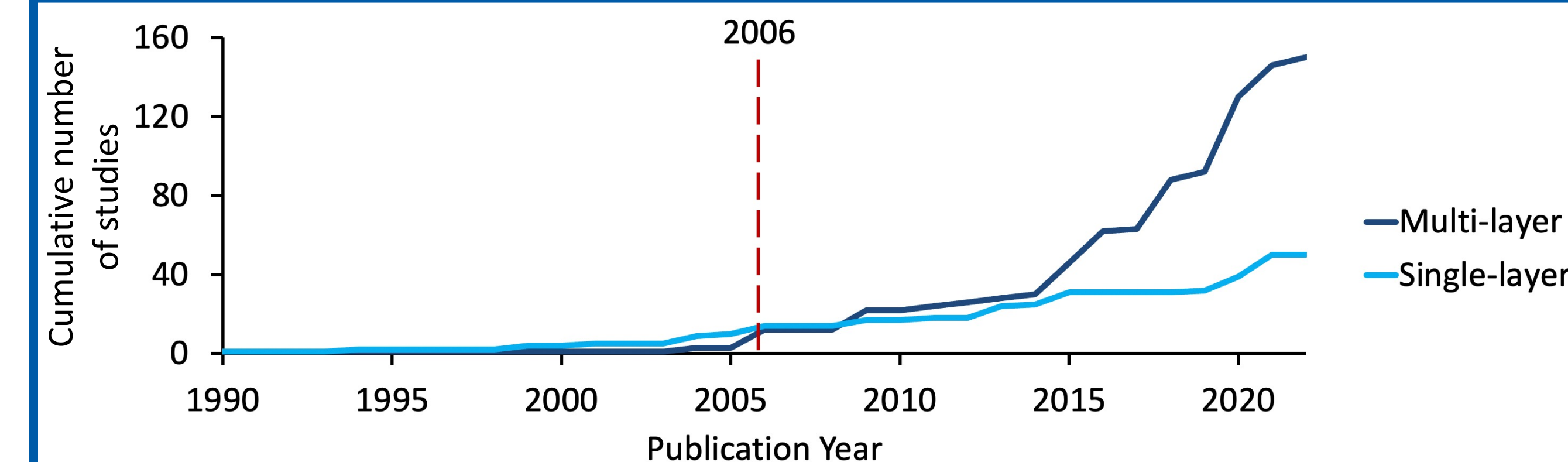


Figure 9. Cumulative number of studies reporting single- and multi-layer repairs (n = 200). NB: endoscopic PNSF first reported in 2006.⁹

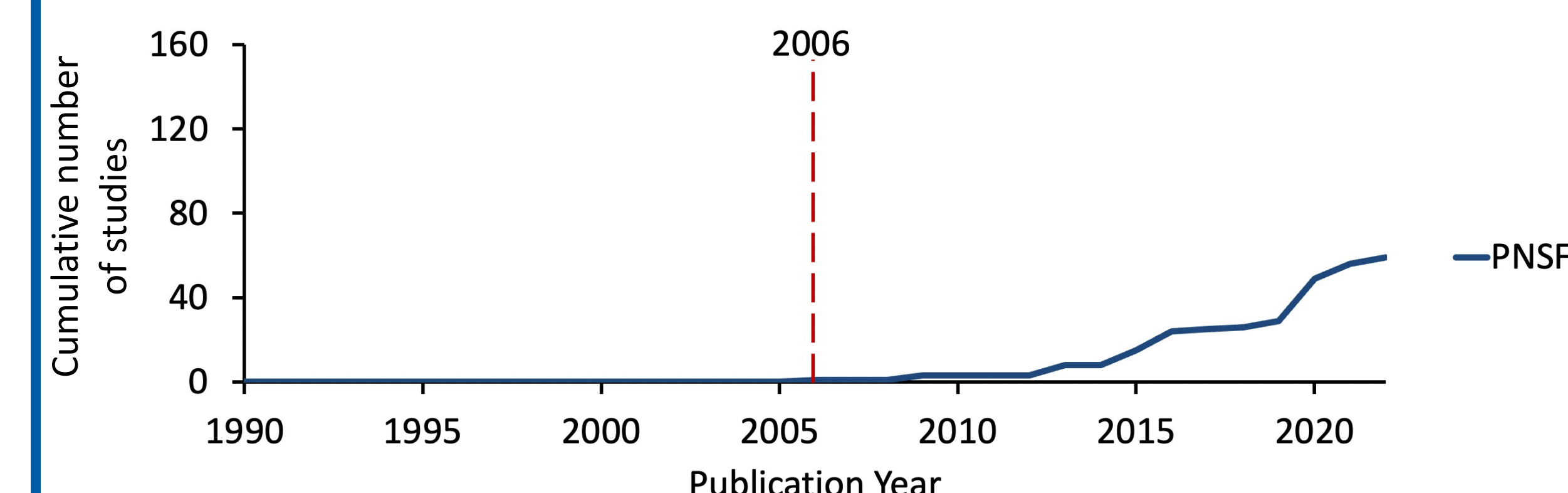


Figure 10. Cumulative number of studies reporting PNSF (n = 59)

Conclusions

- No statistically significant differences in intraoperative or postoperative CSF leak, recurrence, or revision in children who underwent multi- or single-layer repairs
- Across all age groups, no evidence for multi-layer over single-layer repairs and vice versa
- Multi-layer repairs increasingly reported in literature, likely due to greater experience with endoscopic endonasal surgery

FUTURE DIRECTIONS:

- Prospective trials to evaluate single vs. multi-layer repair types in children
- Re-analysis of data to stratify by age group, defect location, or etiology

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