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TRI-PLATFORM TRENDS IN ENDOSCOPIC SPINE SURGERY: A DECADE OF DIGITAL SEARCH BEHAVIOR AND ACADEMIC OUTPUT (2015-2025)

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ABSTRACT

Objective: Endoscopic spine surgery (ESS) has emerged as a widely adopted minimally invasive technique for the treatment of spinal disorders. Over the past decade, both clinical utilization and scholarly attention toward ESS have increased. This study aimed to examine temporal trends in public and academic engagement with ESS across multiple digital platforms.

Materials and Methods: Data from Google trends and YouTube searches for the terms "endoscopic spine surgery" and "endoscopic discectomy" were were collected as monthly relative search volume (RSV) series covering 1 October 2015-1 October 2025. Monthly RSVs were then aggregated to yearly values (annual arithmetic mean and annual sum) for year-level analyses. Bibliometric data were retrieved from the Scopus database for the same period. Temporal patterns were assessed using linear regression, and correlations between online search activity and publication output were examined using statistical analysis.

Results: The annual number of ESS-related publications demonstrated a significant upward trend over time (adjusted R^2=0.966). Public interest, as reflected by Google and YouTube search activity, showed parallel increases during the study period. A very strong positive correlation was observed between annual YouTube RSV and Scopus publication counts (Pearson's r=0.956). This relationship remained statistically significant after correction for multiple comparisons (unadjusted $p=4.29\times10^{-6}$, Benjamini-Hochberg adjusted $p=1.72\times10^{-5}$), supporting the robustness of the association.

Conclusion: This tri-platform analysis demonstrates a sustained and parallel increase in both public and academic engagement with ESS over the past decade. Rather than implying causality, the observed associations highlight concurrent temporal trends and underscore the growing role of digital platforms in shaping the awareness and dissemination of surgical knowledge. These findings should be interpreted as descriptive and hypothesis-generating, emphasizing the importance of accurate, evidence-based online content to support clinical education and informed engagement.

Keywords: Endoscopic spine surgery, endoscopic discectomy, minimally invasive spine surgery, Google trends, YouTube, bibliometric analysis, digital health trends

INTRODUCTION

Endoscopic spine surgery (ESS) has emerged over the past two decades as a transformative approach in spine care. Initially developed for lumbar discectomy (LD) procedures, it has evolved into a versatile surgical method applicable to lumbar stenosis, cervical and thoracic pathologies, spinal infections, and even interbody fusion surgeries[1]. Advances in high-definition endoscopic optics, improved instrumentation, and irrigation technologies have enabled surgeons to access and treat spinal pathologies through small percutaneous incisions, minimizing collateral tissue damage and enhancing surgical visualization[2].

The clinical benefits of ESS are increasingly well documented. Patients typically report less postoperative pain, lower complication rates, and quicker return to work or daily activities[2]. However, barriers such as steep learning curves, the need for advanced training, and high equipment costs remain significant challenges for widespread adoption among spine surgeons[3].

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With the growth of patient-centered healthcare and digital literacy, analyzing public interest in medical procedures has become increasingly important. Today, patients actively participate in decision-making and remain informed about current developments and new treatments. Tools such as Google trends, YouTube search analytics, and publication databases like PubMed offer valuable insights into how public and academic attention evolves. In orthopedic and spine surgery literature, several studies have utilized these tools to assess interest in topics such as arthroplasty, stem cell injections, and foot and ankle procedures[4-9]. These trends reflect both patient curiosity and the demand for less invasive, faster-recovery surgical options. Despite its growing popularity, no comprehensive study has assessed ESS using a multimodal approach that integrates Google trends, YouTube behavior, and Scopus academic output. The objective of this study is to quantitatively evaluate the growing interest in ESS from both public and scientific perspectives via global Google search trends (GT), YouTube search trends (YT) and the frequency of peer-reviewed publications via Scopus trends. We hypothesized that public interest in ESS, as reflected by online search activity, has increased in parallel with academic output over the past decade. Specifically, we anticipated a positive temporal association between trends in digital search behavior and the volume of peer-reviewed publications, reflecting the simultaneous growth of public engagement and scientific research in this field.

MATERIALS AND METHODS

A multiplatform analysis was conducted to evaluate public and academic interest in endoscopic spinal procedures. Data were obtained from Google trends, YouTube trends (via Google trends YouTube filter), and the Scopus database, focusing on the search terms "endoscopic discectomy (ED)" and "ESS". The search terms "ESS" and "ED" were chosen to strike a balance between terminological accuracy and common usage. While more specific terms like "full-endoscopic" or "unilateral biportal endoscopy" exist in search engines, these expressions are not consistently used across different databases and time periods. Therefore, we opted to use the two more comprehensive terms from ESS. The study period (October 2015-October 2025) was selected to represent a complete and recent decade for longitudinal trend analysis, serving as a methodological convention rather than reflecting a specific milestone year in the evolution of ESS.

Google Trends

Google trends is a free, open-access tool that tracks the frequency of specific search terms entered into the Google search engine over time and across geographic regions. For any given term, GT presents data as relative search volume (RSV), normalized on a scale from 0-100. A value of 100 indicates peak popularity during the selected period and region, whereas other data points are scaled proportionally. A value of 0 denotes that the term had a search frequency of less than 1% of the peak RSV during that time. When multiple terms are compared, RSV values are relative to the most popular term in the group. In this study, Google trends data were extracted via the "web search" option, worldwide, spanning October 2015-October 2025. Monthly RSV data were downloaded in comma-separated values format and subjected to linear regression analysis[10,11].

YT Analysis

Unlike general web searches, YouTube offers access to direct demonstrations of surgical procedures, expert presentations, and patient explanations, making it a critical platform for assessing the interest of both the public and healthcare professionals. Public interest in video-based search behavior was evaluated using the YouTube search filter within Google trends. The same keywords were queried under the "YouTube search" setting, restricted to worldwide data for October 2015-October 2025. Monthly RSVs were retrieved and analyzed via linear regression to assess temporal changes

Scopus Bibliometric Analysis

A comprehensive bibliometric search was conducted via the Scopus database on October 2025. The following query was applied: [TITLE-ABS-KEY("ED") OR TITLE-ABS-KEY("ESS")] AND PUBYEAR >2014 AND PUBYEAR <2026 AND [LIMIT-TO (DOCTYPE,"ar") OR LIMIT-TO(DOCTYPE,"re")] AND [LIMIT-TO(PUBSTAGE,"final")] AND (LIMIT-TO (SRCTYPE,"j")] AND [LIMIT-TO (LANGUAGE,"English")]. Only articles and review papers published in English and indexed as final publications in peer-reviewed journals between 2015 and 2025 were included. A total of 1307 records were retrieved and exported for further bibliometric trend analysis. To ensure methodological consistency and data reliability, only peer-reviewed original articles and review articles indexed as final publications in Scopus were included. Conference proceedings, editorials, letters, and other non-peer-reviewed document types were excluded, as these formats often differ in review rigor and may introduce heterogeneity that could confound bibliometric trend analyses.

Statistical Analysis

Annual publication data from Scopus were combined with four time series representing public interest: YouTube trends for ESS, Google trends for ESS, YouTube trends for ED, and Google trends for ED. Raw monthly "month/value" tables were converted to date format and sorted chronologically. Missing observations were retained. The data were loaded into the RStudio platform (Ver. 2025.05.1+513) using the readxl package. The tidyr, tibble, dplyr, tidyverse, lubridate, broom, and ggpmisc packages were used for table preprocessing and statistical analysis. For each monthly series, two annual summaries were calculated: the arithmetic mean (value_mean) and the total sum (value_sum). These yearly aggregates were then merged with the Scopus data via the "year" variable, yielding a comprehensive table (year+pubs+*_mean/*_sum), as presented in Table 1.

Table 1. Annual summary of public interest and academic output related to ESS (2015-2025). The table presents yearly data from GT and YT for the search terms ESS and ED together with the corresponding number of peer-reviewed publications indexed in Scopus. For each search term, annual mean and total RSV values are reported, enabling direct comparison between public search interest and scientific publication trends over time

Year	Pubs_sum	YT-ESS_mean	GT-ESS_mean	YT-ED_mean	GT-ED_mean	YT-ESS_sum	GT-ESS_sum	YT-ED_sum	GT-ED_sum
2015	18	0	16	0	39.166666666667	0	96	0	235
2016	35	0	25.083333333333	0	29.083333333333	0	301	0	349
2017	48	3.4166666666667	17.25	14.333333333333	32.583333333333	41	207	172	391
2018	56	17.75	19.333333333333	45.666666666667	34.333333333333	213	232	548	412
2019	81	16.333333333333	23.833333333333	49.166666666667	38.083333333333	196	286	590	457
2020	132	26.5	26.666666666667	34.75	32.75	318	320	417	393
2021	123	40.833333333333	39.75	28.916666666667	31.583333333333	490	477	347	379
2022	132	36.916666666667	44.666666666667	28.666666666667	35.333333333333	443	536	344	424
2023	161	58.416666666667	51.25	41.5	50.666666666667	701	615	498	608
2024	188	80.833333333333	61	52	55.083333333333	970	732	624	661
2025	192	84.5714285714286	76.5714285714286	63.4285714285714	70.7142857142857	592	536	444	495

ESS: Endoscopic spine surgery, GT: Google search trends, YT: YouTube search trends, ED: Endoscopic discectomy, RSV: Relative search volume, Pubs: Publication counts

For each annual *_mean series we fitted;
(a) an ordinary least squares (OLS) model pubs~search_mean,
(b) a log-log model log (pubs+1)~log (search_mean+1) to assess elasticity and stabilize variance, and
(c) a robust regression using Huber M-estimation (MASS::rlm) to assess sensitivity to influential observations. Regression standard errors, coefficients, and p/adusted-p values are reported.
A linear regression model (pubs~year) was employed to assess the temporal trend in Scopus publication counts. Both the observed and fitted values were visualized, with the regression equation and corresponding adjusted R^2 displayed on the graph. For all regression models, the statistical significance of the slope was assessed using a t-test. The same approach was applied to the monthly trend models.

Model Fit and Error Metrics

To assess how well simple linear trends fit the monthly platform series, we calculated three complementary fit/error metrics for each monthly series:

- Mean absolute percentage error (MAPE),
- Mean absolute deviation (MAD), and
- Mean squared deviation (MSD).

These metrics were computed between observed monthly values and trend-predicted values as follows:

$$\mathbf{MAPE} = \frac{1}{n}\sum_{i=1}^{n} \left| \frac{y_i - \hat{y}_i}{y_i} \right| \times 100$$

$$\mathbf{MAD} = \frac{1}{n}\sum_{i=1}^{n} \left| y_i - \hat{y}_i \right|$$

$$\mathbf{MSD} = \frac{1}{n}\sum_{i=1}^{n} (y_i - \hat{y}_i)^2$$

MAPE expresses relative percentage error. MAD reports the average absolute error in the original measurement units. MSD emphasizes larger deviations by squaring residuals. We note that MAPE is undefined when y_i=0 y_i=0. In such cases (rare in our monthly series), the denominator was set to 1 for the affected months, and the presence of zeros is explicitly reported. These metrics are used here as descriptive summaries to compare the quality of trend fits across series. They are not used as dichotomous "accept/reject" criteria because acceptable thresholds depend on context.
Pearson and Spearman correlation coefficients were computed between annual publication counts (pubs) and each platform's annual mean. As multiple pairwise tests were performed, p-values were adjusted using the Benjamini-Hochberg method. Adjusted p-values are reported as p_adj. To explore temporal relationships, we computed Pearson correlations between search_t and pubs_{t+L} for lags of L=0,1,2,3 years. These lag correlations are exploratory and reported with BH-adjusted p-values where applicable. For each annual *_mean series, we fitted;

(a) an OLS model pubs~search_mean,
(b) a log-log model log (pubs+1)~log (search_mean+1) to assess elasticity and stabilize variance, and
(c) a robust regression using Huber M-estimation (MASS::rlm) to assess sensitivity to influential observations. Regression standard errors, coefficients, and p-values (adjusted for multiple comparisons) are reported.

RESULTS

The monthly YT-ESS series (YouTube index for ESS) exhibited a positive long-term trend, with periodic peaks and sharp increases. A linear trend line confirmed a statistically significant increase over time (Figure 1).

The GT-ESS series (Google trends index for ESS) also showed an upward trend, with intermittent surges in interest, which is consistent with growing public curiosity (Figure 2).

Linear fits for YT-ED and GT-ED (YouTube and Google trends indices for ED) also indicated a generally increasing trend. However, these series displayed greater volatility, with zero-level plateaus and intermittent spikes. Consequently, these series yielded higher error metrics (MAPE, MAD, and MSD), suggesting more variability in public interest (Figures 3 and 4).

A significant upward trend was observed in the annual number of publications in Scopus, as indicated by the linear regression model (pubs~year), yielding the equation y=-36896.73+18.318×year with adjusted R^2=0.966, demonstrating that the linear model explains a substantial portion of the year-to-year variation in publication counts (Figure 5).

There is a strong, statistically significant association between YT-ESS and annual Scopus publication counts (Pearson's r≈0.956, p≪0.001). GT-ESS mean is also strongly and positively associated with annual publication counts (Pearson's r≈0.909, p<0.001). The YT-ED and GT-ED series also show positive correlations (YT-ED r≈0.762, p≈0.006; GT-ED mean r≈0.713, p≈0.014). The OLS regression pubs~YT-ESS_mean yielded an intercept ≈41.64 and a slope ≈1.94, indicating that, on average, a one-unit increase in the YouTube index is associated with approximately 1.94 additional publications per year (σ^2≈363.5, Akaike information criterion ≈99.86). A log-log transformation (logpubs~log_YT-ESS) was also significant, with a log-coefficient ≈0.446, indicating positive elasticity on a percentage-change basis. Results from a robust regression (Huber M-estimator) produced coefficients consistent with OLS (robust slope ≈1.94), suggesting that outliers do not unduly drive the estimates. Monthly time-series plots show a long-term upward trend alongside isolated sharp peaks reflecting episodic effects. Durbin-Watson tests indicate residual autocorrelation in some models. Cook's distance analysis identifies a single influential observation in the GT-ESS series; such influential points can materially affect estimated coefficients and should be considered when interpreting results (Figure 6).

A strong positive association was observed between YouTube search interest for ESS (YT-ESS) and annual Scopus publication counts (r≈0.96, p<0.001). Google trends for ESS (GT-ESS) also showed a strong positive correlation with publication volume (r≈0.91, p<0.001). Search trends for ED demonstrated moderate positive associations. Linear regression analysis indicated that increases in YouTube search interest were associated with higher annual publication output. YT-ESS correlates very strongly with annual Scopus publication counts (Pearson's r=0.956, p<0.001; Spearman's rho similar). The OLS model pubs~YT-ESS_mean returned an estimated slope of ≈1.94 (highly significant), and this effect is stable to a Huber M-estimator (robust regression) and to a log-log transformation; sensitivity checks (Cook's distance) flagged a single influential observation in the Google trends series but did not materially change the GT-ESS result.

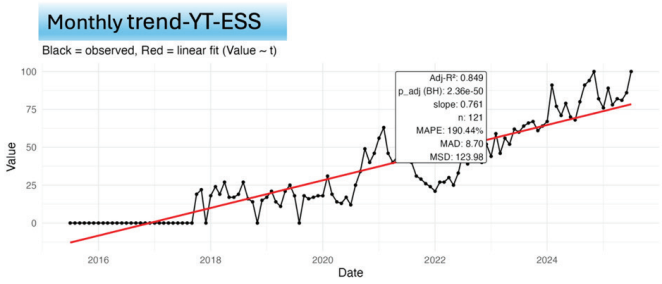

Figure 1. Monthly trend in YT-ESS: the black line represents observed monthly RSV between October 2015 and October 2025. The red line represents the fitted linear regression model, which shows a significant upward trend over time (slope =0.761, adjusted R^2=0.849, p<0.001). YT: YouTube search trends, ESS: Endoscopic spine surgery, RSV: Relative search volume, MAPE: Mean absolute percentage error, MAD: Mean absolute deviation, MSD: Mean squared deviation

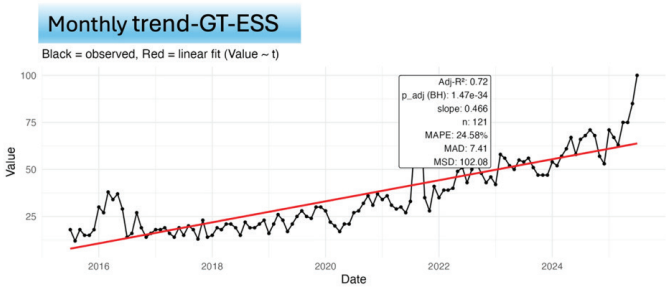

Figure 2. Monthly trend in GT-ESS: observed RSV data (black) and linear regression trend line (red) demonstrate a steady increase in public interest through general Google searches. Temporal fluctuations are visible, but the overall trend is positive and statistically significant. The red line in this figure illustrates the overall long-term trend (slope =0.466, adjusted R^2=0.720, p_adj (BH) =1.47×10^{-34}). GT: Google search trends, ESS: Endoscopic spine surgery, RSV: Relative search volume, MAPE: Mean absolute percentage error, MAD: Mean absolute deviation, MSD: Mean squared deviation, BH: Benjamini-Hochberg

DISCUSSION

In this study, we conducted a comprehensive evaluation of public and academic interest in ESS using a tri-platform approach encompassing Google trends, YouTube trends, and bibliometric data from Scopus. To the best of our knowledge, this represents the first investigation to concurrently assess ESS-related search behaviors across general web and video platforms and to correlate these patterns with publication trends in the scientific literature.

Google trends data demonstrated a clear upward trajectory in online search activity for "ESS" and "ED" throughout the past decade. Similarly, analysis of YT revealed a significant increase in public engagement with video-based content related to these procedures, as confirmed by linear regression models indicating statistically significant growth in RSV over time. This suggests not only increased curiosity about ESS in the general population but also a shift toward audiovisual platforms as preferred sources of medical information.

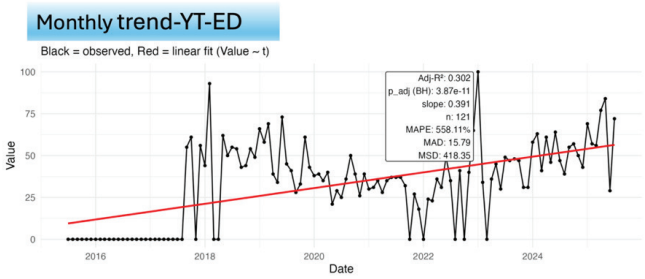

Figure 3. Monthly trend in YT-ED: search activity for this term displays a general increase over time, despite some variability and periods of low or zero RSV. The linear trend line (red) confirms an upward trajectory (slope =0.391, adjusted R^2=0.302, p_adj (BH) =3.87×10^{-11}). YT: YouTube search trends, ED: Endoscopic discectomy, RSV: Relative search volume, MAPE: Mean absolute percentage error, MAD: Mean absolute deviation, MSD: Mean squared deviation, BH: Benjamini-Hochberg

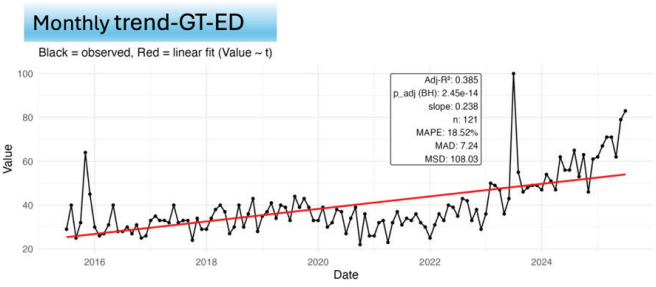

Figure 4. Monthly trend in GT-ED: a similar pattern of gradual growth is seen in general web searches for "endoscopic discectomy". The plot shows fluctuating but rising interest, supported by the linear regression model (slope =0.238, adjusted R^2=0.385, p_adj (BH) =2.45×10^{-14}). GT: Google search trends, ED: Endoscopic discectomy, MAPE: Mean absolute percentage error, MAD: Mean absolute deviation, MSD: Mean squared deviation, BH: Benjamini-Hochberg

These findings suggest not only heightened curiosity regarding ESS among the general population but also a discernible shift toward audiovisual platforms as preferred sources of medical information. Another salient observation derived from our analysis is the parallel rise in academic interest, evidenced by the increasing number of peer-reviewed publications in this domain.

Most bibliometric analyses share common data sources: Thomson Reuters' Web of Science (WoS) and Elsevier's Scopus. Wu et al.[12] reported a steady increase in the number

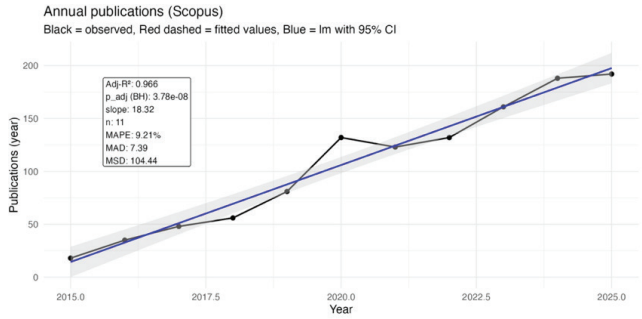

Figure 5. Annual number of publications in Scopus data: the bar chart displays the yearly count of articles retrieved from the Scopus database between 2015 and 2025 using the defined search terms. The red line shows the fitted linear regression line (y=-36896.73+18.318×year), with an adjusted R^2=0.966, indicating a strong increase in academic interest. The red line in this figure illustrates the overall long-term trend (slope =18.32, adjusted R^2=0.966, p_adj (BH) =3.78×10^{-8}). CI: Confidence interval, MAPE: Mean absolute percentage error, MAD: Mean absolute deviation, MSD: Mean squared deviation, BH: Benjamini-Hochberg

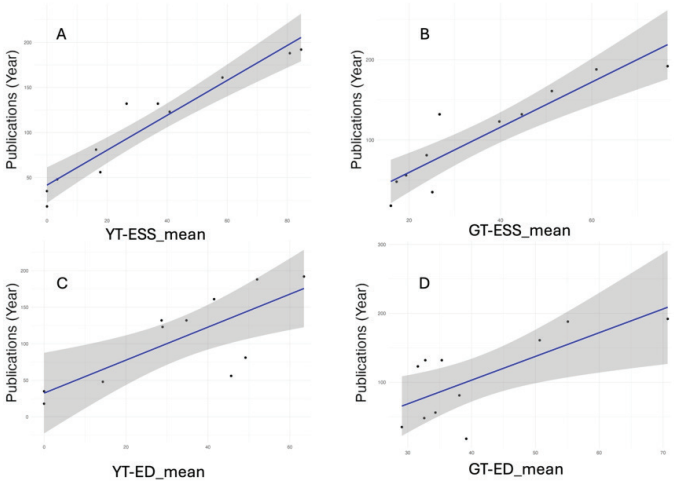

Figure 6. Correlations between Scopus publications and social media trends. A-publication-YT-ESS correlations-slope ≈1.937, adjusted R^2≈0.9045, Adj p-value≈4.29e-06; B-publication-GT-ESS correlations-slope ≈2.815, adjusted R^2≈0.8079, Adj p-value≈0.000104; C-publication-YT-ED-slope ≈2.2555, adjusted R^2≈0.5340, Adj p-value≈0.006413; D-publication-GT-ED-slope ≈3.444, adjusted R^2≈0.4541, Adj p-value≈0.013737. GT: Google search trends, YT: YouTube search trends, ED: Endoscopic discectomy, ESS: Endoscopic spine surgery, BH: Benjamini-Hochberg

of publications on ED over 20 years on the basis of the WoS database. They stated that they used the WoS database in their studies and stated that the WoS database is the most widely used tool for bibliometric analysis. Bibliometric variables are used in many fields for a variety of purposes, particularly in research evaluation. Previous comparative studies have shown that Scopus and WoS have a high degree of overlap in key scientific disciplines[13,14]. We used Scopus as the database in our study.

Since Kambin's[15] pioneering efforts to adapt arthroscopy for lumbar disc herniation, ED has undergone substantial advancements over recent decades. With progressive technological innovation and the accumulation of surgical expertise, the initial indications for ESS-once confined to LD-have expanded considerably. At present, ESS is increasingly utilized in the management of complex spinal pathologies, including lumbar spinal stenosis and cervical degenerative disorders, signifying a paradigm shift in the surgical treatment of spinal diseases[16,17]. Accordingly, to capture a broader spectrum of relevant procedures and reflect evolving terminology, our search strategy incorporated both "ED" and the more inclusive term "ESS".

The emergence of a novel or trending surgical technique does not inherently denote superiority or inferiority relative to established standards of care. Historical precedents illustrate divergent trajectories: total meniscectomy, once conventional, yielded to a paradigm favoring meniscal preservation as evidence accumulated on its deleterious long-term joint effects[18]; similarly, the shift from rigid anatomical fixation toward relative stability with intramedullary nailing reflected a deeper understanding of fracture biology[19]. By contrast, some innovations endure when they deliver durable clinical value; for example, the transition from open to arthroscopic rotator cuff repair reduced postoperative morbidity while maintaining comparable functional outcomes[20]. Taken together, these examples suggest that popular adoption alone does not determine the fate of a technique; rather, sustained clinical benefits, reproducibility, and integration into training ecosystems shape whether a procedure declines or becomes embedded in practice. The potential trajectory of ESS appears more aligned with the latter pathway: sustained public and academic interest-driven by perceived advantages such as shorter recovery, minimal invasiveness, and preservation of anatomical structures-indicates that ESS may continue to consolidate its role where its benefits are demonstrable and outcomes are rigorously validated[16,21,22]. In practical terms, this trajectory carries clear implications for the community: surgeons should pursue structured, competency-based training pathways and outcome tracking to ensure safe diffusion of technique; educators should adopt standardized curricula that include simulation-based modules to accelerate skill acquisition, and surgeons should participate in structured training; and content creators-including clinicians and institutions-should prioritize accurate, peer-reviewed, and patient-appropriate materials to meet rising public information needs and mitigate misinformation.

Our findings highlight a growing reliance on audiovisual platforms for surgical education and patient information, reflecting a broader digital shift in healthcare communication. YouTube analytics confirm this trend; however, prior studies indicate that most ESS-related videos lack scientific rigor and peer review[23,24]. This raises concerns about the dissemination of incomplete or misleading content to both patients and surgeons. As video-based platforms become integral to medical education, academic institutions and clinicians must assume responsibility for producing accurate, evidence-based, and pedagogically sound material. Improving the quality of online resources is essential to counter misinformation and support informed decision-making.

The stronger correlation between YouTube activity and academic publication output, compared to Google trends, likely reflects the inherently visual and procedural nature of ESS. Video platforms provide an effective medium for conveying complex surgical techniques, thereby influencing both professional education and patient engagement. These dynamics underscore the growing role of audiovisual media in shaping knowledge dissemination within technically demanding surgical fields. While these associations do not imply causality, they suggest parallel trends driven by technological innovation and global interest in minimally invasive spine surgery.

Although strong correlations were observed between online search activity and publication volume, these associations should not be interpreted as evidence of a causal relationship. The present findings reflect temporal co-occurrence rather than directional influence, and do not establish whether increased public interest drives academic output or vice versa. Instead, both trends are likely influenced by shared external factors such as technological advances, dissemination of surgical innovations, and growing global interest in minimally invasive spine surgery. Therefore, the results should be interpreted as descriptive indicators of parallel evolution rather than causal associations.

Study Limitations

This study has several limitations. This study is limited by its exclusive use of English-language keywords, potentially introducing language bias. Additionally, certain ESS subcategories were excluded to maintain methodological consistency. Also this study is descriptive and exploratory: observed concurrent trends across platforms do not establish causal relationships between online interest and scientific publications. Other limitation of this study is the relatively small number of annual observations (n=11), which reflects the temporal scope of available data rather than sampling insufficiency. This limited sample size may reduce statistical power and widen confidence intervals in regression analyses, thereby restricting the strength of causal inferences. Consequently, the observed associations should be interpreted as descriptive indicators of parallel trends rather than definitive evidence of causal relationships.

Platform indices may be influenced by non-clinical factors (media coverage, viral content, platform algorithm changes), and such influences cannot be disentangled from the present data. For these reasons, results should be interpreted as hypothesis-generating and informative about parallel temporal patterns rather than definitive evidence of causal linkage.

CONCLUSION

This tri-platform analysis reveals a substantial rise in public and academic interest in ESS over the past decade, reflecting its growing presence in both patient awareness and scientific discourse. The alignment between increased Google and YouTube search volumes and the rising number of peer-reviewed publications underscores ESS as a rapidly evolving field with significant translational momentum. Future efforts should focus on optimizing the quality and accessibility of online content while supporting evidence-based adoption of ESS in clinical practice.

Ethics

Ethics Committee Approval: This study did not involve human participants, animal experiments, or patient data. All analyses were conducted using publicly accessible datasets (Google trends, YouTube analytics, and Scopus).

Informed Consent: Ethical approval and informed consent were not required, in accordance with institutional and international research guidelines.

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Footnotes

Authorship Contributions

Surgical and Medical Practices: O.G.M., Concept: O.G.M., C.Y., H.C., G.G., K.A., Design: O.G.M., C.Y., H.C., G.G., Data Collection or Processing: O.G.M., Analysis or Interpretation: E.E.Y., Literature Search: O.G.M., E.E.Y., Writing: O.G.M., C.Y., H.C., G.G., K.A., E.E.Y., K.A.

Conflict of Interest: No conflict of interest was declared by the authors.

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