

How AI Portrays the Anterior Approach in Total Hip Arthroplasty: A Content Analysis of Search Engines and Large Language Models

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INTRODUCTION: Artificial intelligence (AI)-powered Large Language Models (LLMs) are an increasingly common source for medical information, making it crucial for clinicians to understand their validity and potential biases. Previous research by Shofoluwe et al. in 2017 highlighted a significant positive bias in traditional internet content promoting the Direct Anterior Approach (DAA) for Total Hip Arthroplasty (THA), often emphasizing benefits while neglecting to discuss risks. This study investigates whether this previously documented bias persists or is mitigated in modern AI-generated content, and if AI leverages evidence-based literature. The objective of this study is to analyze AI-generated content regarding THA, specifically the DAA, to assess potential AI bias in patient information sources and evaluate how AI platforms introduce, frame, promote, or critique the DAA.

METHODS: This cross-sectional content analysis examined AI-generated responses from five prominent AI systems: Google Search AI overviews, Perplexity AI, OpenAI’s ChatGPT, Microsoft’s Copilot, and Google’s Gemini. Ten standardized, patient-centered queries (five general THA, five DAA-specific) were submitted to each platform between July 3-5, 2025. Content was systematically coded for DAA benefits, risks, citation practices, comparative framing, and overall tone, adapting criteria from Shofoluwe et al. (2017). A stratified sample of 13 AI responses (26%) was independently assessed by two board-certified orthopedic surgeons to enhance content validity regarding clinical accuracy and bias.

RESULTS: DAA was mentioned in 84% of total responses, with technical details provided in 78%. When multiple approaches were discussed, DAA was listed first in 61% of responses. AI outputs commonly attributed specific benefits to DAA, including faster recovery (72%) and less tissue damage (66%). Crucially, AI models frequently mentioned DAA-specific risks, such as technical demands/learning curve for the surgeon (60%) and that DAA is not suitable for all patients (50%). Lateral femoral cutaneous nerve injury was cited in 40% of responses, substantially higher than the 4.7% reported in Shofoluwe et al.’s study. None of the AI responses collected claimed DAA was the “best” approach or had fewer complications than the more traditional posterior approach for THA. AI platforms provided peer-reviewed literature in 48% of responses, a significant increase from the 3.6% observed in Shofoluwe’s study, though considerable platform variability existed. The overall tone of AI responses regarding DAA was predominantly neutral with 62% having a balanced framing listing both pros and cons of all THA approaches discussed.

DISCUSSION: Our study demonstrates that modern AI-powered LLMs offer a significantly more balanced and comprehensive portrayal of DAA THA compared to traditional internet sources. AI outputs showed a substantial increase in mentions of DAA specific risks, a key distinguishing feature from previous literature reporting the internet’s promotional bias in favor of DAA. Further, AI platforms exhibit improved transparency in citation practices, providing peer-reviewed literature at higher rates than traditional online content, despite inter-model variability. The predominantly neutral tone marks a significant evolution from the incomplete picture previously conveyed online. By offering a more nuanced and evidence-informed overview, AI platforms are poised to foster a more informed patient population, empowering shared decision making and assisting clinicians in assessing AI LLMs as patient information sources. However, these findings reflect a snapshot in time (July 3–5, 2025) of rapidly evolving AI models and are potentially limited geographically, as content was collected entirely within the United Kingdom. Moreover, the inherent subjectivity of qualitative content analysis is noted by the poor inter-rater reliability found for the parent code regarding DAA comparison to other approaches (M5, $\kappa = 0.16$).

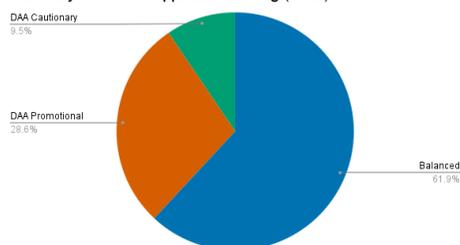
SIGNIFICANCE/CLINICAL RELEVANCE: As AI-powered Large Language Models (LLMs) are an increasingly common resource for individuals seeking medical information, this study is clinically significant by demonstrating that modern models mitigate the promotional bias previously documented in traditional internet content, which often presented an incomplete picture of DAA THA risk. By providing a more balanced, evidence-informed overview that details DAA-specific risks alongside benefits, AI platforms promote realistic patient expectations and empower shared decision-making regarding complex surgical procedures; however, providers should be cautioned that there is significant variability of responses between different AI platforms regarding citation transparency and risk disclosure.

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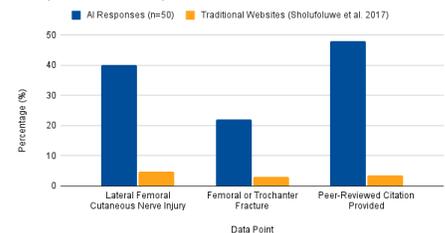
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IMAGES AND TABLES:

Summary of AI THA Approach Framing (n=42)



Comparison of AI Responses and Traditional Websites



Citation Variability by Platform (n=50)

