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Machine Learning Model Uses Pain Sketches to Predict Headache Surgery Outcomes: a literature review

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Introduction
Currently, we are witnessing a new industrial revolution, driven by the advancement of cutting- edge technologies like Artificial Intelligence (AI). Machines are not only executing manual tasks but also engaging in cognitive work, tasks that demand what is now considered intelligence in our contemporary context. Furthermore, machine learning (ML) models are being utilized to forecast the outcomes of headache surgeries based on pain sketches. Pain sketches involve drawings created by patients to depict their pain in various acute conditions and chronic illnesses. Specifically, pain sketches have been employed to predict surgical results for lumbar radiculopathy. In the case of headache surgery, there are distinct pain sketch patterns for each trigger site corresponding to the anatomical location of the affected nerves. Artificial intelligence (AI) has been employed to analyze pain patterns and predict outcomes in headache surgeries, offering a promising approach to forecasting and optimizing surgical results.

Objective
Hence, we conducted a literature review with the objective of comprehensively summarizing the current state of research concerning the use of machine learning models that utilize pain sketches to predict surgical outcomes in headache surgeries.

Methods
The search was conducted in PubMed/MEDLINE and EMBASE in September 2023. The keywords used were "ARTIFICIAL INTELLIGENCE," "MACHINE LEARNING," "DEEP LEARNING," "HEADACHE SURGERY," "MIGRAINE DISORDERS," and "MIGRAINE." We included studies that employed machine learning models using pain sketches to predict outcomes in headache surgery and excluded articles in languages other than English, conference abstracts, and articles of any review type.

Results
Numerous studies and articles have been published on the use of structured algorithmic analysis and AI/ML in predicting outcomes in headache surgery and categorizing pain severity and types. Notably, one study identified that an algorithm assigned substantial predictive value to diffuse pain, facial pain, and vertex pain in predicting surgical outcomes. Another study reported the efficacy of an automated pattern recognition tool in determining the effectiveness of surgery in reducing pain caused by nerve patch headaches. Furthermore, other studies have developed AI-based models for headache diagnosis, yielding promising results.

Conclusion
Therefore, based on research involving structured algorithmic analysis and AI/ML in predicting headache surgery outcomes, categorizing pain severity and types, as well as diagnosis, it is evident that these approaches hold significant promise. They have the potential to enhance surgical decision-making, pain assessment, and the accuracy of headache diagnosis. These advancements can offer substantial benefits to both healthcare providers and patients in the management of headaches.

Keywords: headache surgery; machine learning; migraine disorders.