SUN'IY INTELLEKT VA 3D-BOSMA TIBBIY INNOVATSIYALARI HAMDA ULARNING OAVDA YORITILISHI

ARTIFICIAL INTELLIGENCE AND 3D-PRINTING MEDICAL INNOVATIONS AND THEIR MEDIA COVERAGE

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DOI: https://doi.org/10.5281/zenodo.23293031

ANNOTATSIYA

Ushbu maqolada sun'iy intellekt va 3D-print texnologiyalarining zamonaviy tibbiyotdagi, xususan, jag'-yuz suyagi rekonstruksiyasidagi qo'llanilishi tahlil qilinadi. Muallifning ilmiy tajribasi asosida — post-COVID asoratlari natijasida yuzaga kelgan jag' suyagi defektlarini davolashda SI asosidagi osteonekroz xavfini bashorat qilish algoritmi va bemorga moslashtirilgan 3D-bosma protezlar misolida — bunday innovatsiyalarning amaliy ahamiyati ko'rsatiladi. Shu bilan birga, ushbu murakkab ilmiy-texnik yutuqlarni keng jamoatchilikka tushunarli va ishonchli tarzda yetkazishda OAV va tibbiyot mutaxassislari o'rtasidagi hamkorlikning o'sib borayotgan roli yoritiladi. Maqola jurnalistlar va tadqiqotchilar uchun samarali ilmiy kommunikatsiya yo'llarini taklif qiladi.

Kalit so'zlar: Sun'iy intellekt, 3D-bosma texnologiyalari, tibbiy innovatsiyalar, ilmiy kommunikatsiya, OAV, jag' suyagi rekonstruksiyasi

ABSTRACT

This article examines the application of artificial intelligence and 3D-printing technologies in modern medicine, particularly in craniomaxillofacial reconstruction. Drawing on the author's research experience — an AI-based algorithm for predicting osteonecrosis risk and patient-specific 3D-printed prosthetics for treating jawbone defects arising from post-COVID-19 complications — the practical significance of such innovations is demonstrated. The article also highlights the growing role of collaboration between media professionals and medical researchers in communicating these complex scientific advances to the public in a clear and trustworthy manner, offering constructive approaches to effective science communication.

Keywords: Artificial intelligence, 3D-printing, medical innovation, science communication, media, craniomaxillofacial reconstruction

Over the past decade, artificial intelligence and 3D-printing technologies have moved from experimental laboratory tools to integral components of clinical practice, particularly in complex fields such as craniomaxillofacial surgery. These innovations offer unprecedented precision in diagnosis, treatment planning, and the fabrication of patient-specific implants, fundamentally reshaping how surgeons approach reconstructive procedures. In the field of oral and maxillofacial surgery, for instance, AI-based predictive algorithms are increasingly used to assess complication

risks such as osteonecrosis [Warin et al., 2024: 2], while 3D-printing enables the creation of prosthetics tailored to each patient's unique anatomy [Du et al., 2020: 1292] — a particularly urgent need in cases involving jawbone defects caused by post-COVID-19 complications.

Yet the pace of these scientific advances often outstrips the public's ability to understand and trust them. Complex medical innovations, when communicated through mass media, risk being either oversimplified to the point of inaccuracy or presented in language too technical for a general audience to engage with meaningfully [Choi et al., 2024: 4]. This creates a communication gap at precisely the moment when public understanding — and public trust — matters most, as patients increasingly encounter AI-assisted diagnostics and 3D-printed treatments as part of their care [Razov, Garaganov, 2023: 76].

This gap, however, also represents an opportunity. Closer collaboration between medical researchers and media professionals can transform how scientific breakthroughs reach the public — making coverage both accurate and accessible, while giving journalists the tools to convey nuance without sacrificing clarity [Cheung, Ho, 2024: 8]. This article explores this opportunity through the lens of practical research experience, examining how AI and 3D-printing innovations in maxillofacial reconstruction can be more effectively communicated, and proposing constructive approaches for science journalism in the era of rapid technological advancement in medicine.

Practical Applications of AI and 3D-Printing in Maxillofacial Reconstruction. The treatment of jawbone defects resulting from post-COVID-19 complications presents a compelling case study for the integration of digital technologies in reconstructive surgery. In current research practice, an AI-based algorithm has been developed to predict the risk of osteonecrosis — a severe complication that can significantly compromise surgical outcomes [Kwack, Park, 2023: 136] — allowing clinicians to identify high-risk patients before intervention and adjust treatment protocols accordingly. Complementing this predictive approach, patient-specific 3D-printed prosthetics are designed to match the precise anatomical contours of each defect, improving both functional restoration and aesthetic outcomes [Reconstruction of Craniomaxillofacial Bone Defects, 2024: 3]. When combined with platelet-rich plasma (PRP) applications to support bone regeneration, this triad of technologies — AI prediction, personalized fabrication, and biological enhancement — illustrates how digital and biomedical innovation can converge to address complex clinical challenges that were difficult to manage even a decade ago.

Challenges in Media Coverage of Medical Innovation. Despite the clinical promise of these technologies, translating them into public understanding remains a persistent challenge. Medical and technical terminology — algorithm training, predictive accuracy, biomechanical scaffolding — does not easily lend itself to concise, engaging journalism. As a result, coverage of such innovations sometimes gravitates toward two extremes: either a brief, sensationalized mention emphasizing novelty (“AI predicts disease before it happens”) without explaining underlying limitations, or coverage so technically dense that it fails to reach a general audience at all [Petreska et al., 2025: 1]. Neither extreme serves the public well. Patients making decisions about their own care, and citizens forming views about the role of AI in healthcare more broadly, benefit most from coverage that is both accurate and

accessible — a balance that requires deliberate effort from both researchers and journalists.

Toward Effective Science Communication: Recommendations. Bridging this gap calls for structured collaboration rather than incidental contact between the two fields. Several practical steps can support this: first, researchers can proactively prepare plain-language summaries of their work alongside technical publications, reducing the burden on journalists to interpret specialized findings independently. Second, media outlets covering health and technology can benefit from establishing regular consultation channels with medical researchers, ensuring factual accuracy without diluting narrative clarity [Cheung, Ho, 2024: 10]. Third, joint training initiatives — workshops or seminars bringing together clinicians, researchers, and journalists — can build mutual understanding of each field's constraints and goals. Such collaboration ultimately benefits both sides: researchers gain broader visibility and public trust for their work, while journalists gain reliable expert partners capable of making complex innovations genuinely understandable.

Materials and methods. This article adopts a narrative, interdisciplinary approach, combining a review of the current literature on artificial intelligence and 3D-printing applications in craniomaxillofacial surgery with the author's own clinical and research experience. The material basis of the analysis includes: (1) findings from an ongoing research project involving an AI-based predictive algorithm for osteonecrosis risk assessment in patients with post-COVID-19 jawbone defects; (2) data from the design and clinical application of patient-specific 3D-printed prosthetics used in reconstructive treatment; and (3) a targeted review of recent publications addressing science communication and media coverage of medical AI innovations, drawn from both biomedical and mass-communication sources.

The methodology is descriptive-analytical rather than statistical: rather than measuring media coverage quantitatively, the article synthesizes observed patterns in how technical medical innovations are typically reported, comparing these against the practical realities of clinical implementation described above. This comparative framing — practitioner experience juxtaposed with communication challenges — is intended to ground the recommendations offered in the final section in concrete clinical practice rather than abstract theorizing about science journalism.

Results. The analysis demonstrates that AI-based predictive tools and 3D-printing technologies have already reached a level of clinical maturity capable of meaningfully improving outcomes in complex reconstructive cases, such as jawbone defects arising from post-COVID-19 complications. At the same time, the review of media practices reveals a clear gap between the sophistication of these technologies and the depth of public understanding surrounding them — a gap rooted not in public disinterest, but in insufficient structured collaboration between researchers and journalists. Where such collaboration does exist, coverage tends to be both more accurate and more engaging, suggesting that the proposed recommendations — plain-language summaries, consultation channels, and joint training — are not merely theoretical but grounded in observable best practice.

Conclusion. Artificial intelligence and 3D-printing are transforming craniomaxillofacial reconstruction, offering patients more precise, personalized, and effective treatment options than ever before. Realizing the full societal value of these innovations, however, depends not only on continued scientific progress but also on how effectively that progress is communicated to the public. Strengthening the

partnership between medical researchers and media professionals — through proactive knowledge-sharing, consultation, and joint capacity-building — offers a constructive path forward. Such collaboration would ensure that as medical technology continues to advance, public understanding and trust advance alongside it, ultimately benefiting patients, practitioners, and journalists alike.

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