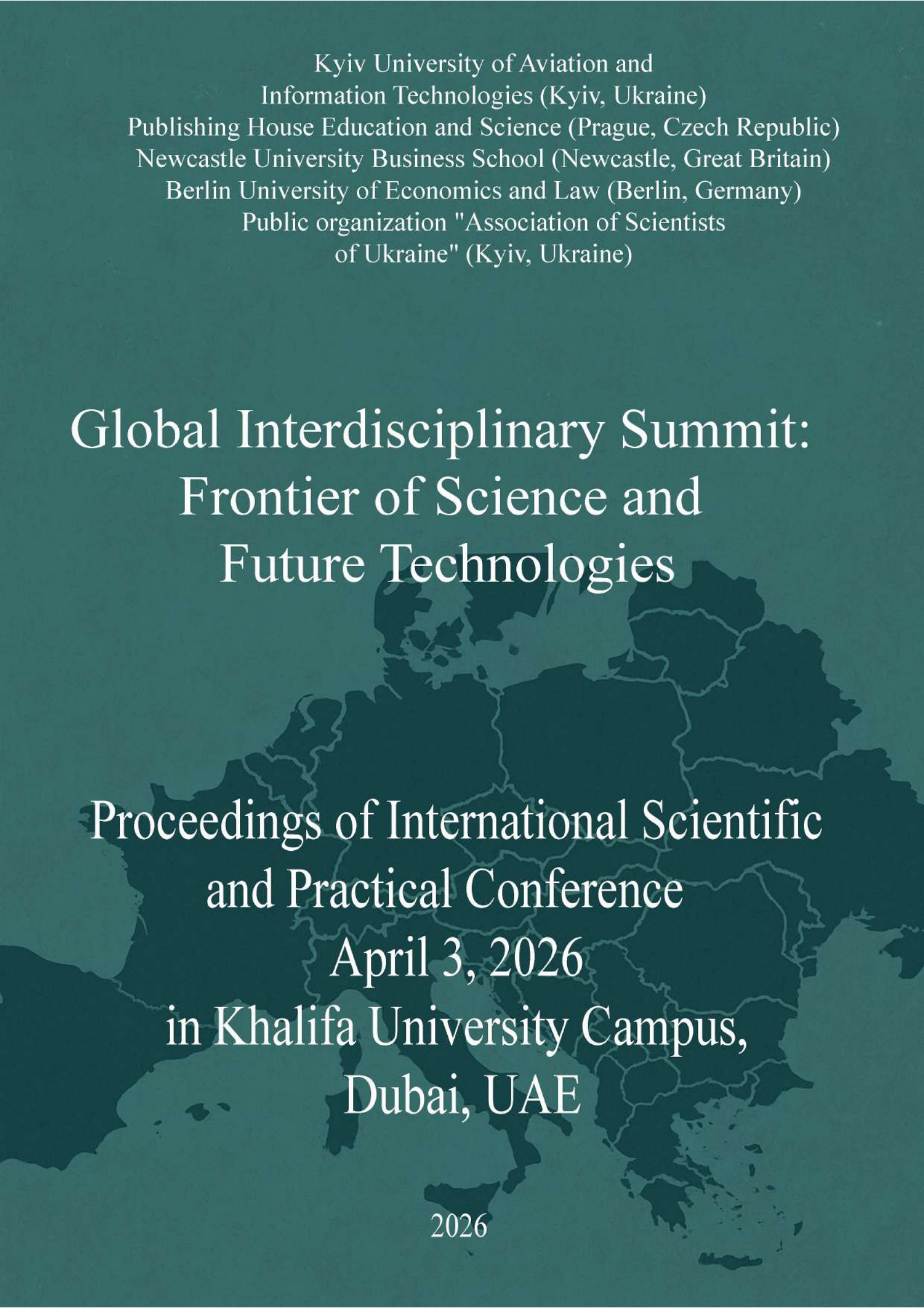
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Rosiiskyi Petro, Tarawneh Shaker, Hordiienko Svitlana

ANALYSIS OF DIGITAL MODELING ERRORS AND JUSTIFICATION OF PRECISION FIT OF SUBPERIOSTEAL IMPLANTS IN SEVERE JAW ATROPHY 121

Голобуцька Наталія

КОМПЕТЕНТНОСТІ МЕДИЧНИХ ПРАЦІВНИКІВ ЩОДО СПЕЦИФІЧНИХ ОСОБЛИВОСТЕЙ НАДАННЯ ОРТОПЕДИЧНОЇ ДОПОМОГИ ДІТЯМ З РУХОВИМИ ПОРУШЕННЯМИ ПРИ ОРГАНІЧНИХ УРАЖЕННЯХ ГОЛОВНОГО МОЗКУ 125

СЕКЦІЯ «ШТУЧНИЙ ІНТЕЛЕКТ ТА НЕЙРОННІ МЕРЕЖІ»

Овчинников Микола

ШТУЧНИЙ ІНТЕЛЕКТ ЯК АДАПТИВНИЙ КОМПОНЕНТ ЦИФРОВОГО ВОДЯНОГО МАРКУВАННЯ МУЛЬТИМЕДІЙНИХ ДАНИХ 132

СЕКЦІЯ «КІБЕРБЕЗПЕКА ТА ЗАХИСТ ВЕЛИКИХ ДАНИХ»

Терещенко Катерина, Терещенко Тетяна

ПІДВИЩЕННЯ ЕФЕКТИВНОСТІ СИСТЕМ ІНФОРМАЦІЙНОЇ БЕЗПЕКИ НА ОСНОВІ ІНТЕГРАЦІЇ ШТУЧНОГО ІНТЕЛЕКТУ У ПРОЦЕСИ РЕАГУВАННЯ НА КІБЕРЗАГРОЗИ 140

Хамітов Віталій, Болтьонков Віктор Олексійович

ФОРМУВАННЯ ІНТЕГРАЛЬНОГО ПОКАЗНИКА ЯКОСТІ ШИФРУВАННЯ ЗОБРАЖЕНЬ 143

СЕКЦІЯ «БЕЗПЕКА НАСЕЛЕННЯ»

Федоришина Юлія, Юрченко Любов

ПОВЕДІНКОВІ ФАКТОРИ ЕВАКУАЦІЯ МАЛОМОБІЛЬНИХ ГРУП НАСЕЛЕННЯ В ПЕРІОД ВОЄННОГО СТАНУ 147

Rosiiskyi Petro, PhD, Associate Professor, Kharkiv National Medical University, Kharkiv, Ukraine

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ANALYSIS OF DIGITAL MODELING ERRORS AND JUSTIFICATION OF PRECISION FIT OF SUBPERIOSTEAL IMPLANTS IN SEVERE JAW ATROPHY

Modern dental implantation demonstrates a rapid transition toward CAD/CAM technologies and additive manufacturing of subperiosteal structures. Despite this progress, clinical data indicate significant errors originating at the digital modeling stage. A primary challenge remains metal artifacts and low CBCT resolution when visualizing the cortical plate in cases of severe atrophy. Studies demonstrate that the discrepancy between the virtual model and actual bone anatomy ranges from 0.2 to 0.5 mm [1]. In the fabrication of subperiosteal implants (SI), such inaccuracies necessitate additional precision and stability. In digital models lacking direct verification, gaps between the bone and the SI are often compensated solely by fixation screws, leading to stress concentration and subsequent bone resorption [2]. Consequently, the framework fails to achieve full-surface adaptation to the bone bed, instead "balancing" on specific points. In such instances, stability relies on an excessive number of additional screws to compensate for the lack of primary fit. The notion that natural regeneration of the mucoperiosteal flap, which integrates over the framework within 3–4 weeks, can stabilize the system is illusory. Soft tissue fixation cannot override the fundamental laws of load distribution. Such hyperfixation merely masks the lack

of congruence, creating a false impression of reliability. In reality, latent stress develops within the system; under cyclic masticatory loads, the framework inevitably acts as a destructive lever. The situation is further complicated by metal artifacts, which can deform the perceived bone architectonics by 15–20% [3]. In these regions, dental technicians often resort to subjective visual approximation of bone contours, compromising the accuracy of the digital protocol [1, 3]. When a framework is fixed with micro-gaps, a destructive “micropumping effect” occurs: during mastication, the structure acts as a pump, drawing bacteria beneath the periosteum and transforming the biological growth zone into a focus of chronic inflammation [4].

However, the practice of multi-screw stabilization is constrained by rigid anatomical determinants associated with severe alveolar bone resorption. In the maxilla, the potential for additional fixation points is limited by progressive maxillary sinus pneumatization in posterior regions and the low position of the nasal floor in the anterior zone. Current clinical observations indicate that when utilizing customized SI frameworks under conditions of extreme bone deficiency, the risk of iatrogenic perforation of air-bearing cavities during screw installation reaches 22–25% [4]. Attempts to visualize these thin cortical walls are frequently compromised by low CBCT resolution, critically increasing the likelihood of planning errors. This poses a direct threat of oroantral communication and the development of persistent sinusitis. Given the inherent digital modeling discrepancy (0.2–0.5 mm), attempts to achieve rigid distal fixation carry an 18–20% risk of direct or indirect (compression) injury to the inferior alveolar nerve [4]. Consequently, the clinician’s effort to compensate for inadequate framework congruence by increasing the number of screws becomes a high-risk factor. Combined with the "leverage effect," such hyperfixation creates a vicious circle: screws placed in critical proximity to neurovascular bundles and cavities transform into mechanical stress concentrators under cyclic masticatory loads. Instead of the

intended stability, the system generates latent destructive forces, provoking micromobility of the SI framework, chronic inflammation, and accelerated bone resorption in fixation zones. The solution lies in shifting the paradigm from "hyperfixation" toward enhancing the interfacial fit of the SI structure itself.

Modern clinical protocols demonstrate that superior congruence between the implant’s inner surface and the bone bed microrelief minimizes the need for auxiliary screws—a goal that remains technically challenging within traditional remote digital planning. In contrast to methods based solely on remote interpretation of digital data, direct bone-level impression (DBLI) ensures primary stability via the “clip-fit” principle, which serves as the foundation for a favorable long-term prognosis. This method of direct data acquisition allows for preventive preparation of the bone bed to prevent exposure of the framework branches and to identify the most effective fixation zones. Consequently, a high level of interfacial precision and error-free spatial modeling of the supporting elements are achieved—goals that currently remain largely declarative in purely virtual CBCT-based workflows.

The proposed approach should be viewed not as an alternative to progress, but as a necessary standard of precision. Integrating proven methods of direct verification into digital modeling protocols is essential for the predictable, long-term functioning of subperiosteal structures. Our data indicate that individualized framework design radically optimizes the dental rehabilitation pathway. Unlike traditional techniques that require lengthy preparation for standard implants, the customized SPI technique offers precise integration based on the patient's existing anatomy. This shifts the focus from adjusting bone volume to fit the hardware to modeling an individualized support with physiological load distribution, while considering the soft tissue biotype. This approach significantly reduces the treatment duration: while traditional bone grafting requires 9–12 months for maturation, SPI provides reliable support for fixed prostheses in a significantly

shorter timeframe (up to six times faster). As a result, immediate functional loading protocols become technically feasible within 24–72 hours.

Conclusion. The necessity to systematize clinical data and minimize risks in the rehabilitation of patients with severe jaw atrophy is evident. Based on our extensive clinical experience, we consider the use of implants based on direct impressions to be the most justified treatment strategy in complex cases of extreme bone deficiency—until digital protocols achieve the requisite level of reliability and predictive accuracy.

References

1. Imburgia M, [et al.] Precision of Subperiosteal Implants: Comparison between Direct Bone Impression and Digital CT Models. Journal of Clinical Medicine. 2021;10(14):3120. doi:10.3390/jcm10143120

2. Nemtoi A, [et al.] Biomechanical behavior and bone remodeling around custom-made subperiosteal implants: A 3D finite element analysis and clinical correlation. Materials. 2023;16(4):1452. doi:10.3390/ma16041452

3. Codari M, [et al.] Digital workflow and artifacts in CBCT: Impact on the precision of bone-borne surgical guides and implants. International Journal of Computerized Dentistry. 2023;26(1):15–24. doi:10.3233/SCD-220015

4. Figliuzzi M, [et al.] Subperiosteal Implants for Atrophic Maxilla: Clinical Success and Mechanical Failure Risks. Case Reports in Dentistry. 2020;2020:8832502. doi:10.1155/2020/8832502