Journal of Orthopaedic Translation 23 (2020) A4

Contents lists available at ScienceDirect

Journal of Orthopaedic Translation

journal homepage: www.journals.elsevier.com/journal-of-orthopaedic-translation

Editorial

Transformation of preclinical study results into clinical applications: Improving protocols and clinical practice in translational orthopaedics

Clinical and basic science both rely on constant change and transformation in order to better understand diseases and provide the best care to patients. However, patients and the presentation of their diseases are highly individual. While personalised care remains out of reach, we can strive to make current treatment options more adaptable and better suited to different patients. This issue provides various studies that contribute to this idea both through basic research that contributes to clinical science as well as clinical studies or trials themselves.

Surgical practices and treatments for common orthopaedic disorders are continuing to evolve in order to reduce healing time, improve post-surgical outcomes, and also provide better surgical options for patients in different situations. In this issue, Chen et al. used finite element analysis to assess three surgical methods to treat cervical spondylotic radiculopathy in order to predict various functional outcomes for patients [1]. Similarly, Han et al. assessed two surgical techniques used to treat kyphoscoliosis, assessing the functional outcomes, as well as the benefits of each technique [2]. Post-surgical complications may arise when proper rehabilitation protocols are not well designed and conducted in time. Ling et al. have investigated the outcomes of earlier weight-bearing rehabilitation protocol after hallux valgus surgery in order to achieve better prognosis and facilitate earlier return to work [3].

It is not only surgical techniques that are improving, but also drugs, rehabilitation, and novel materials that supplement or delay surgery. Severe acute respiratory syndrome (SARS) was commonly treated with corticosteroids, which in turn led to the development of osteonecrosis of the femoral head. Huang et al. have conducted a study to test whether a Chinese herbal medicine can be used to treat these patients and improve their well-being, having been monitored over fourteen years (on average) [4]. Sebastian et al. have conducted a systematic review that investigates the efficacy of antibiotic-loaded bone cement in preventing prosthetic joint infection [5]. Lo et al. provide another review to this issue that discusses the therapeutic options available to treat sarcopenia in various type of patients [6].

Animal models have transformed medicine and they are fast becoming more complex, accurate, and informative. Martineau et al. investigated the administration of 24R,25-dihydroxyvitamin D_3 in a mouse model in order to assess its safety and efficacy in aiding fracture repair healing [7]. Cao et al. demonstrate in a mouse model that three-dimensional printed scaffolds for tendon-to-bone interface engineering is safe and may be used to further assess the efficacy of the scaffold [8]. Two studies in this issue present the use of umbilical cord-derived stem cells to assess their regenerative capabilities in rat models. Liu et al. demonstrate their efficacy in fracture healing [9], while Tong et al. demonstrate the efficacy in osteoarthritis treatment [10]. Animal models are also frequently used to study disease pathogenesis. Li et al. demonstrate that hepcidin deficiency leads to bone loss and identifies the pathways involved [11] and Wu et al. demonstrate a new model for Achilles tendinopathy [12]. Lastly, Wong et al. present a systematic review on current animal fracture models of osteosynthesis-associated infections that may serve as a good reference for researchers that are going to establish similar models [13].

These studies establish ways in which basic research and clinical applications complement each other through translational research and in doing so are improving our knowledge for better patient care.

References

[1] Chen C, Yuchi C-X, Gao Z, Ma X, Zhao D, Li J-W, et al. Comparative analysis of the biomechanics of the adjacent segments after minimally invasive cervical surgeries versus anterior cervical discectomy and fusion: a finite element study. J Orthop Translat 2020;23:107–12.

[2] Han C, Hai Y, Yin P, Cha T, Li G. In vivo deformation of the spine canal before and after surgical corrections of severe and rigid kyphoscoliosis. J Orthop Translat 2020;23:1–7.

[3] Ling SKK, Wu Y-M, Li C, Lui TH, Yung PS-H. Randomised control trial on the optimal duration of non-weight-bearing walking after hallux valgus surgery. J Orthop Translat 2020;23:61–6.

[4] Huang Z, Fu F, Ye H, Gao H, Tan B, Wang R, et al. Chinese herbal Huo-Gu formula for the treatment of steroid-associated osteonecrosis of femoral head: a 14-year follow-up of convalescent SARS patients. J Orthop Translat 2020;23:122–31.

[5] Sebastian S, Liu Y, Christensen R, Raina DB, Tägil M, Lidgren L. Antibiotic containing bone cement in prevention of hip and knee prosthetic joint infections: a systematic review and meta-analysis. J Orthop Translat 2020;23:53–60.

[6] Lo JH-t, U KP, Yiu T, Ong MT-y, Lee WY-w. Sarcopenia: current treatments and new regenerative therapeutic approaches. J Orthop Translat 2020;23:38–52.

[7] Martineau C, Kaufmann M, Arabian A, Jones G, St-Arnaud R. Preclinical safety and efficacy of 24R,25-dihydroxyvitamin D_3 or lactosylceramide treatment to enhance fracture repair. J Orthop Translat 2020;23:77–88.

[8] Cao Y, Yang S, Zhao D, Li Y, Cheong SS, Han D, et al. Three-dimensional printed multiphasic scaffolds with stratified cell-laden gelatin methacrylate hydrogels for biomimetic tendon-to-bone interface engineering. J Orthop Translat 2020;23:89–100.

[9] Liu Y, Fang J, Zhang Q, Zhang X, Cao Y, Chen W, et al. Wnt10b-overexpressing umbilical cord mesenchymal stem cells promote critical size rat calvarial defect healing by enhanced osteogenesis and VEGF-mediated angiogenesis. J Orthop Translat 2020;23:29–37.

[10] Tong W, Zhang X, Zhang Q, Fang J, Liu Y, Shao Z, et al. Multiple umbilical cord–derived MSCs administrations attenuate rat osteoarthritis progression via preserving articular cartilage superficial layer cells and inhibiting synovitis. J Orthop Translat 2020;23:21–8.

[11] Li G, Zhang H, Wu J, Wang A, Yang F, Chen B, et al. Hepcidin deficiency causes bone loss through interfering with the canonical Wnt/β-catenin pathway via Forkhead box O3a. J Orthop Translat 2020;23:67–76.

[12] Wu Y-T, Wu Y-T, Huang T-C, Su F-C, Jou I-M, Wu C-C. Sequential inflammation model for Achilles tendinopathy by elastin degradation with treadmill exercise. J Orthop Translat 2020;23:113–21.

[13] Wong RMY, Li T-k, Li J, Ho W-T, Chow SK-H, Leung SSY, et al. A systematic review on current osteosynthesis-associated infection animal fracture models. J Orthop Translat 2020;23:8–20.

Chelsea Hopkins*, Ling Qin

The Chinese University of Hong Kong, Prince of Wales Hospital, Department of Orthopaedics & Traumatology, Shatin, N.T, Hong Kong, China

* Corresponding author.

E-mail address: chelsea.hpkns@gmail.com (C. Hopkins).

https://doi.org/10.1016/j.jot.2020.07.001