

Keratoconus – “No Rub, No Cone”

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There was no grant support.

Introduction

Recently, I had the privilege to participate in an International Society of Refractive Surgery (ISRS) externship program specializing in cornea and refractive surgery at the Rothschild Foundation Hospital, Paris, France. I joined this program shortly after I had completed my residency in ophthalmology at the Shaare-Zedek Medical Center, Jerusalem, Israel. The duration of our residency program lasts for five years, during which time we attend clinics and participate in all sub-specialty surgeries. Specifically, while on cornea rounds, we assist in keratoconus clinics equipped with advanced imaging and diagnostic tools and perform cross-linking (CXL) procedures when indicated.

As a resident pursuing a career in the field of cornea and refractive medicine, I worked together with Dr. David Smadja, a colleague and mentor. I was apprised of the Department of Ophthalmology, of the Rothschild Foundation Hospital, Paris, France, a prestigious research and treatment center. This department is well known throughout Europe and around the world for its outstanding anterior segment service. The head of the department is Dr. Damien Gatinel, a renowned refractive surgeon and a prominent, distinguished innovator known for his “out of the box” creativity. His revolutionary methodology in managing keratoconus patients, and his declaration that he had never performed CXL on his patients, captivated me and was one of the many reasons that attracted me to pursue, under his guidance, an externship program at the Rothschild Foundation Hospital.

The “no rub, no cone” theory formulated by Dr. Gatinel, offers an alternative explanation for the pathogenesis of keratoconus. Based on numerous observations and extensive research, a mechanical theory was proposed as the root cause for the development of keratoconus. It is believed that keratoconus is not a true ectasia, but rather a corneal deformation, with a mechanical origin, arising in patients with at-risk cornea. The proponents of this hypothesis believe that it further explains the clinical characteristics of keratoconus, i.e. the variability of the disease between patients and between eyes of the same patient, as well as the predominance of sporadic keratoconus cases.

During my externship, I had the opportunity to observe first-hand the team’s unique clinical approach of diagnosing and managing keratoconus patients referred to the clinic from all over the

country. The evaluation process began with a thorough history taking that included a risk factor screening with an emphasis on eye-rubbing history and sleeping habits. The meticulous questioning was subsequently followed by a detailed demonstration by the patient of his/her precise eye-rubbing technique and sleeping position. Careful attention was given to the exact rubbing mechanism: did the eye-rubbing involve the knuckles? Wrist? Fingers pad? Which hand? What direction? The sleeping position was also analyzed: On which side? Does the eye lay on the hand? Is the hand above or beneath the pillow, etc. All patient presentations were carefully documented for patient education and research purposes. Following the anamnesis, a refraction test and complete ocular bio-microscopic examination were completed, corneal tomography was performed (Orbscan, Pentacam) and corneal biomechanical properties were assessed (ocular response analyzer (ORA)).

Upon assessment of the patients, I was amazed by the striking correlation that arose between the patients' eye-rubbing and/or sleeping habits and the keratoconus pattern- i.e laterality, severity and sometimes even the thinning location in the cornea. Patients who rubbed their eyes with their knuckles exhibited a more severe keratoconus than patients who used their fingertip pads. If a patient was found to exclusively rub one eye, or sleep only on one side, that side revealed a more prominent disease. Indeed, when a patient stated that he had stopped rubbing his eyes, no progression was observed in his topography. In fact, I was surprised that all keratoconus patients, several with over a year of follow-up, did not progress at all, in spite of the fact that none of the patients had undergone CXL. The only intervention offered was patient education, advising to avoid applying any kind of pressure to the eyes, sometimes to the extent of wearing an eye-shield at night, treating an underlying allergy or ocular surface disease. Moreover, the only patient who presented with keratoconus progression, was the last patient of the day; a 24-year-old male, referred to the cornea clinic due to keratoconus disease progression, despite having performed a CXL procedure in the past!

To conclude, the ISRS externship program accorded me the opportunity to work alongside and learn from one of the world's top refractive surgeons. New friendships were cultivated, and future research collaborations were created. As described above, I observed new diagnostic tools and novel

management techniques in the field of keratoconus. Upon my return, the knowledge I had gained during the externship greatly influenced my medical practice. Moreover, it had a direct effect on the medical staff in my department, and above all, helped us provide better care to our patients. I want to thank the ISRS for this fascinating and educational experience, and strongly recommend that all residents register to participate in their future externship programs.