inSIGHT

Volume 2 | Issue 1 Article 9

2022

Seeing Eye to Eye: An Overview of Strabismus and Approach to Treatment

Shreya Swaminathan, BS
Thomas Jefferson University

Seeing Eye to Eye: An Overview of Strabismus and Approach to Treatment

By Shreya Swaminathan, BS | Faculty Mentor: Barry Wasserman, MD

Figure 1. *Strabismus correction surgery can be used to correct esotropia (1A, 1B) and exotropia (1C)*

Strabismus is a heterogenous group of conditions characterized by the misalignment of the eyes. It may manifest as constant or intermittent deviation, meaning the eyes sometimes appear well aligned, or straight, and sometimes appear misaligned. Vision can be normal in some patients, but when associated with amblyopia, may be decreased vision in one eye. There is sometimes diminished binocular vision, with decreased depth perception.

Twin and family studies suggest a possible genetic component to the etiology of strabismus.[1] Strabismus most commonly occurs sporadically and in otherwise healthy patients, but risk factors that increase the likelihood of developing strabismus include exposure to teratogens such as alcohol, retinopathy of prematurity, premature birth, and low birthweight.[2] Secondary causes of strabismus include monocular vision loss from diseases like retinoblastoma or cataract, neurodevelopmental disorders,

craniofacial syndromes. Abnormalities and disorders affecting extra-ocular muscles and/or their innervation may also affect ocular alignment.

Strabismus is sometimes described by the direction of the misaligned eye. In esotropia, the misaligned eye deviates medially toward the nose. In exotropia, the eye deviates laterally toward the ear. Vertical misalignment is called hypertropia when the eye drifts or deviates upwards and hypotropia when the eye deviates downwards. The strabismus is described as comitant when it is the same in all gazes, but incomitant when it changes depending on the direction the patient is looking. For example, a patient with a cranial nerve VI palsy may develop a large angle esotropia when looking toward the side of the palsy but may have relatively good ocular alignment when looking away from the palsy. This can create variable double vision, or diplopia, for some patients. Esotropia, convergent alignment of the eyes, is more common in children than exotropia, or divergent alignment of the eyes.[3] Figure 1 depicts adult patients with esotropia and exotropia before and after strabismus surgery.

Strabismus can be corrected with nonsurgical intervention in many cases. Sometimes correcting the vision with glasses can achieve excellent ocular alignment. In some cases, eye exercises, sometimes referred to as vision therapy or orthoptics, can help align the eyes. In cases when nonsurgical interventions are insufficient, strabismus is often corrected through surgical intervention. The surgery is same day and often requires less than an hour to change a patient's life. The goal of strabismus surgery is to effectively balance the forces of the muscles on the globe. This modification improves ocular alignment and in turn, reduces diplopia. More specifically, strabismus surgery often involves recession or resection. Recession changes the position of muscle attachment to weaken its function. First, a suture is placed through the muscle at the attachment site. Next, the muscle is detached from the scleral surface and reattached more posteriorly, effectively 'loosening' the muscle. Resection, on the other hand, involves removing a portion of the muscle and reattaching the muscle to the original insertion site to effectively 'tighten' the muscle.[4] Figure 2 highlights the differences between recession and resection.

Some strabismus surgeons utilize a technique called adjustable sutures. In these procedures, the muscle position is moved to a desired location, but placed on a suture with a sliding knot. The patient can then be tested after surgery, and if necessary, the position refined with local anesthesia. These procedures require proper patient selection as cooperation and sometimes additions anesthesia is required. Whether adjustable or not, all strabismus surgery carries small risks. While serious risks like infection and loss of vision are extremely rare, a small number of patients do require another surgery later in life, as the eyes may deviate again.

Treating strabismus not only improves ocular alignment, but also ameliorates the

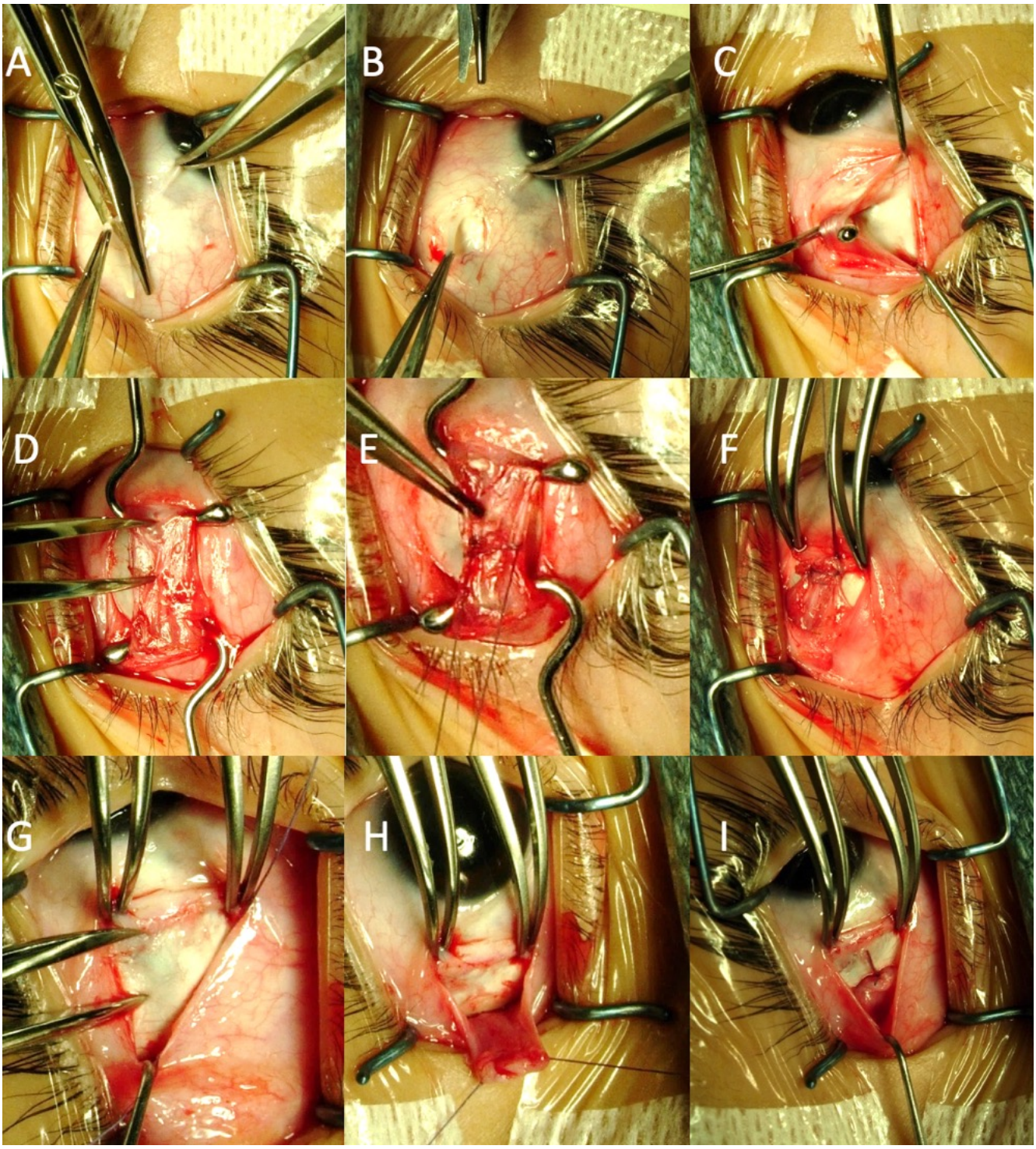

Figure 2. *Strabismus muscle involves cutting through the conjunctiva (2A) and tenon's fascia (2B) to isolate the lateral rectus muscle, as seen resting on the hook (2C). In a resection, the amount to be resected is measured using a caliper (2D) and a suture is placed accordingly (2E). The portion of the muscle located anterior to the suture is resected and the muscle is then reattached to the globe (2F). This serves to strengthen the ocular muscle. In a recession, the caliper measures the position where the new insertion of the muscle will be placed (2G). The initial suture is placed at the insertion (2H) in contrast to the suture placement in a resection. The lateral rectus muscle is reinserted to the superficial sclera posterior to the original position of the insertion (2I) to loosen the muscle and weaken its function.*

negative psychosocial impacts associated with the condition. Many patients, particularly adults with longstanding misalignments, are told their strabismus is 'just cosmetic.' Patients with untreated strabismus report more psychosocial difficulties that tend to intensify in adulthood, contrary to popular belief of dissipation with age. Specifically, strabismus can impact self-image, sports participation, school achievement, and interpersonal relationships. Occasionally, patients report difficulty securing employment or false accusations of cheating due to the inability to make eye contact. For these reasons, strabismus is not considered cosmetic, and surgery is covered by insurance. Strabismus surgery offers the opportunity to make a substantial difference in patients' lives and can be extremely rewarding for both the patient and the surgeon. Future studies are needed to further quantify the benefits of strabismus correction from a psychosocial standpoint.[5]

References

1. Michaelides M. The genetics of strabismus. J Med Genet. 2004;41(9):641-646. doi:10.1136/jmg.2004.021667
2. Maconachie GDE, Gottlob I, McLean RJ. Risk Factors and Genetics in Common Comitant Strabismus: A Systematic Review of the Literature. JAMA Ophthalmol.
3. 2013;131(9):1179-1186. doi:10.1001/jamaophthalmol.2013.4001
4. Bommireddy T, Taylor K, Clarke MP. Assessing strabismus in children. Paediatrics and Child Health. 2019;30(1):14-18. doi:10.1016/j.paed.2019.10.003
5. Strabismus Surgery - American Association for Pediatric Ophthalmology and Strabismus. Accessed December 18, 2021. https://aapos.org/glossary/strabismus-surgery
6. Psychosocial Aspects of Strabismus Study | JAMA Ophthalmology | JAMA Network. Accessed December 18, 2021. https://jamanetwork.com/journals/jamaophthalmology/fullarticle/640327