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John Shea Jr. the Founder of the Stapedectomy for Otosclerosis

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Abstract

This paper devoted attention to the life of the discoverer of the stapedectomy. In 2015, John Joseph Shea (1924-2015). died at the age of 90 due to respiratory insufficiency. His legacy is invaluable for the current reconstructive ear surgery. Together with Harry Treace he developed the Teflon® stapes prosthesis which turned out to be the most successful solution for repairing hearing loss due to otosclerosis. Due to his progressively daring stapectomy operation (1955 & 1956), the suffering of the millions of otosclerosis patients has since then substantially reduced hearing loss. Nowadays, the stapedectomy with the interposition of a stapes prosthesis is the treatment of choice for otosclerosis and the procedure has become almost routine for the experienced ear surgeon. The procedure is now performed worldwide and taught to novice ear surgeons. All this thanks to the pioneering work of John Joseph Shea. He was the founder of the current successful surgical treatment of otosclerosis.

Introduction

On Sunday 8 February 2015, John Joseph Shea died at the age of 90. Some time before he and his wife Lynda Mead Shea (former Miss America 1960) had celebrated their 50th wedding. John J. Shea was born in Memphis on September 4, 1924. He was the third child of the six children of Dr. John Joseph Shea, Sr. (1889-1952) and Catharine Flanagan Shea. After the primary school (Christian Brothers High School) John Shea studied at the University of Notre Dame in Indiana and began his medical study at the age of 19 at the Harvard Medical School in Boston. He finished his medical studies at the Massachusetts Eye and Ear Infirmary. Dr.Shea then served in the army during the beginning of the Korean War (1950-1953). In 1952 he took over the practice of his father (an eminent general ENT doctor) in Memphis. John Shea's interest was mainly in ear surgery. He was the founder of the current successful surgical treatment of otosclerosis.

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Fig 1 John Joseph Shea Jr.

From stapes mobilization to stapes prosthesis

Inspired by the work and the publication of Samuel Rosen[1] about the success of the stapes mobilization operation Shea *(fig 1)* visited Rosen in the autumn of 1953. Rosen advised Shea to go to Vienna to practice the stapes mobilization method on cadavers. Rosen arranged an introduction for Shea with Franz Altmann, former head of the ENT department in Vienna. In January 1954 he travelled to the „first ear clinic" founded by

Fig 2 Howard House

Fig 3. Harry Treace with John Shea showing their stapes prosthesis design

Adam Politzer. Led by Kurt Burian Shea assisted in the classic fenestration operations for otosclerosis. He spent the rest of his time in the laboratory with the dissections of fresh temporal bones (1 Austrian Shilling each!) and he studied in the library the old publications of the earliest otologists of the 19th century. The publication of Johannes Kessel (Graz) from 1876 [2], in which a stapes extraction was suggested as a treatment, made a big impression on him. To his surprise, Shea came across an American publication by Frederick L. Jack from 1892 [3] describing a case report of a successful stapedectomy with a 10-year follow-up. Coincidentally, Shea had met Jack as a Boston junior assistant in 1948 during one of the Staff Meetings. The publication of Jack convinced Shea that the removal of the stapes should be possible without causing a hearing loss. After his stay in Vienna, Shea returned to Memphis where he performed many stapes mobilizations and otosclerosis fenestrations. Triggered by a Howard House publication from Los Angeles about new modifications to the stapes mobilization method in otosclerosis, John Shea followed a one-month course at the House Ear Clinic. However, Shea stayed in Los Angeles for six months instead of a month. It clicked well between Howard House *(fig 2)* and John Shea. Howard saw that John was a gifted ear surgeon with innovative ideas. One evening while chatting about the operations of that day, John suggested removing the entire fixed stapes and repositioning a prosthesis in the oval window. Howard was a bit skeptical about this rigorous approach, but he found the idea interesting. House never wanted to discourage people and said to Shea: *„Any idea is better than no idea and many people have no ideas.“* [4] After his stay at the House Ear Clinic, Shea began to shape his idea for a stapes prosthesis

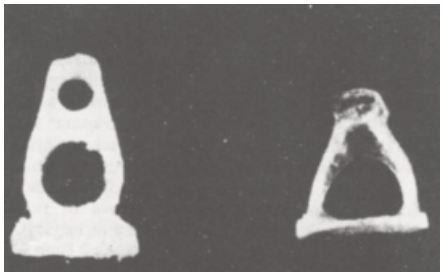

Fig 4. Teflon® replica of stapes made by Harry Treace

The first stapes prosthesis

On September 14, 1955, Shea performed his first ear surgery in which he removed a stapes and covering the oval window with a thin patch of subcutaneous connective tissue. As a prosthesis, a piece of cortex bone was obtained as homograft from the Camp-

bell Clinic Bone Bank. The piece of bone was placed between the incus and the oval window. The initial result was good. The patient initially heard much better and there was no dizziness. Unfortunately, the hearing deteriorated after some time and the middle ear showed rejection symptoms so that Shea decided to remove the placed bone again. This procedure can be regarded as the very first revision of a stapedectomy. Patient then received a hearing aid. With this experience, Shea decided to choose biocompatible material and the newly discovered tetraflur ethylene (Teflon®) was used to develop a stapes prosthesis. An orthopedic surgeon in his hospital had already successfully placed a hip of Teflon® (from Richards). The chief engineer at Richards Manufacturing Company in Memphis was Harry Tilson Treace (1917-1994) and Shea told him his idea about a Teflon® stapes prosthesis. On a Friday afternoon Harry Treace *(fig 3)* got a few stapeses of John Shea's temporal bones and the following Monday he presented a Teflon® replica of a stapes *(fig 4)*. The first patient was carefully selected for the implantation of the prosthesis. It was a 54-year-old woman with a strong conductive hearing loss at one ear and a low hearing loss at the other ear. On 1 May 1956 the operation took place in local anaesthesia. The stapes was removed without any effort and the oval window was covered with a vein graft obtained from the back of the hand. The Teflon® prosthesis was placed around the incus, while the foot of the prosthesis was resting on the vein graft. Patient immediately heard much better after placing the prosthesis. That was at 1:00 p.m. 1 May 1956. Together with Harry Treace, Shea developed many different patented Teflon® stapes and middle ear prostheses.

The reaction to the first stapedectomy with interposition

After this very first stapedectomy with interposition surgery, Shea continued to perform both stapes mobilizations and fenestration operations. Enthused by his first results Shea told his findings to Howard House. He encouraged him to present the recently obtained results with the stapedectomy at the first symposium dedicated to the mobilization of the stapes. On 17 May 1956 this symposium of the Triological Society took place in Montreal. House foresaw that many reputable otologists would have strong criticism on Shea stapedectomy, and he devised a tactical plan. As a session chairman, House agreed with Shea in advance that at the end of the morning session for lunch House would ask the room to ask only one question. John Shea would then raise his hand and then have the opportunity to report his operation and the results. Immediately after his presentation,

Fig 5. Cover LIFE with right under John Shea with a microscope

Howard would then close the session and announce the lunch so that no thorny discussion would arise. This is how it happened and immediately after the presentation of John Shea Howard House spoke the following words: „The meeting is adjourned" and thus prevented a violent attack on the revolutionary stapes operation for otosclerosis. During the following lunch, John Shea was completely shunned by his colleagues and sat alone at an empty table. Initially, the medical community responded extremely skeptically. Shea was heavily criticized by his older contemporaries and his treatment was labeled as reckless and dangerous.

Fig 6. John Shea „Honorary Fellowship of the Royal College of Surgeons of England" by John Hunter statue (1992)

The success after the first stapedectomy

However, the stapedectomy with interposition of a stapes prosthesis proved to be a good and reliable solution for hearing improvement in otosclerosis. Soon after the publication of the results of the stapedectomy [5], the intervention was embraced by the international otology community as the definitive surgical treatment of otosclerosis. The fame of John Shea reached its peak when, in September 1962, he appeared with a photograph made during a stapes operation on the cover of the magazine Life Magazine *(fig5)*. According to the magazine, John Shea was one of the hundred most important Americans of the so-called „Take-Over Generation". Sometime later Shea was named by the London Times as one of the „1,000 Makers of the Twentieth Century". Shea was a member of more than 50 scientific societies. In addition to this, he was Clinical Professor of Otology at the University of Tennessee, the University of Mississippi, the University of North Carolina and Tulane University. An honourable doctorate was awarded to him at Christian Brothers University and Rhodes College in Memphis. In 1992, John Shea received the honourable award: Honorary Fellowship of the Royal College of Surgeons of England. *(Fig 6)*

The scientific contribution of John Shea

Shea's first publication with his father dates back to July 1949 and was published in the Laryngoscope on the subject of „haematology". Afterwards, more than 250 Shea publications appeared. One of his latest publications was written with his eldest son Paul [7] and so a family tradition repeated itself. After working in the Memphis Eye and Ear Hospital for years, John Shea built his current Shea Clinic in 1985 *(fig 7)*. He performed more than 50,000 ear operations during his career, including about 25,000 stapedectomy operations. In addition, Shea was responsible for many innovations in ear surgery. Together with Treace he developed many types of middle ear prostheses (more than 50 patents), ear microscopes, microbeads and micro ear instruments. Shea

Fig 7 the Shea Ear Clinic at Poplar and Ridgeway in Memphis USA

was also at the basis of the intratympanal perfusion therapy for the treatment of Ménière [8] disease. Shea continued to work until he retired in 2011. In 2012, Shea donated his „John J. Shea, Jr., MD Collection" to the Memphis Public Library and Information Centre. The collection already includes the published and unpublished publications

of Shea from 1949 to the present with the aim of being a source for further scientific research

His legacy

On Sunday, February 8, 2015, John Joseph Shea died at 90 years of age due to respiratory failure. He was at home during his death and surrounded by his wife and his five children. On Saturday 14 February, the funeral service took place and John Joseph Shea was ordered at the cemetery Calvary Cemetery. His legacy for current reconstructive middle ear surgery is invaluable. Due to its progressively daring stapedectomy operation, the suffering of millions of otosclerosis patients with substantial hearing loss has virtually disappeared. Nowadays, the stapedectomy/stapedotomy with the interposition of a stapes prosthesis is the treatment of choice for otosclerosis and the procedure is almost a routine for the experienced ear surgeon. The procedure is now performed worldwide and taught to novice ear surgeons. All this thanks to the pioneering work of the pioneer John Joseph Shea

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