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MOVEMENT OF THE ARTIFICIAL EYES – TO PEG OR NOT TO PEG

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Prosthesis motility has remained one of the important factors for deciding about the success of socket rehabilitation surgery with intraorbital implants. Direct coupling of the prosthesis with the implant through drilling and pegging has emerged as an option for enhancing artificial eye movements.

Aim of this study is to have an objective measurement of prosthetic motility in pegged versus unpegged porous orbital implants alongwith a subjective assessment and complications associated with pegging.

METHODS:

A bioceramic orbital implant prepared from calcium Hydroxyapatite (HAp) powder via a novel wet chemical route (1) was used for socket reconstruction following enucleation or evisceration in 75 patients since 2001. drilling and pegging as an optional procedure was offered after thorough counseling. This study included the report of 14 patients who underwent drilling since 2003 with a minimum follow-up period of six months. Pegs were prepared from inert nonporous ceramic material namely Alumina. Later on back surface modified molded prosthesis were fitted. Videophotographs of artificial and natural eye movements were taken from a uniform distance and equal camera parameters. The displacements were calculated from a computer analysis. Prosthesis movement was expressed as a percentage of the normal eye movement, calculated from the ratio of the prosthetic displacement to the normal eye displacement in horizontal and vertical directions. The pegged prosthetic motility divided by the unpegged one determined the percent change in motility associated with pegging.

SURGICAL PROCEDURE:

Under local anaesthesia, site for drilling was marked through a conformer. Conjunctiva and Tenon's (with sclera) were nicked and implant exposed. A hole of adequate depth and diameter was drillied with sterile 18 G needle and a suitable peg was introduced. An appropriately back surface dimpled artificial eye was molded after a minimum period of 3 weeks allowing conjunctivalisation of the hole.

Table 1

Patient	Age	Sex	Indications of surgery	Eye op	Type of surgery	Size of implant	Complications
1	7	M	Painful blind eye	R	Enucleation	18mm	-
2	35	M	Trauma	L	Evisceration	18mm	Peg extrusion
3	25	F	Corneal degeneration	L	Enucleation	20mm	-
4	26	M	Corneal opacity	R	Evisceration	16mm	-
5	33	M	Phthisical eye	R	Enucleation	20mm	-
6	30	F	Phthisical eye	L	Enucleation	16mm	Peg extrusion
7	62	M	Phthisical eye	R	Enucleation	18mm	-
8	11	F	Endophthalmitis	R	Evisceration	18mm	Granuloma
9	31	M	Phthisical eye	R	Enucleation	18mm	-
10	26	F	Phthisical eye	R	Enucleation	18mm	Peg extrusion
11	25	F	Corneal opacity	L	Evisceration	20mm	-
12	26	M	Trauma	R	Enucleation	18mm	-
13	23	M	Corneal degeneration	L	Enucleation	16mm	-
14	71	M	Neovascular glaucoma	R	Evisceration	18mm	-

$\frac{431}{14} = 30.7$

$\frac{258}{15} = 18.6$

$\frac{30}{14} = 21.42$

RESULTS:

14 pegged patients were included in this study with 9 males and 5 females. The average age was 30.7 years (range 7 to 71 years). Average gap between pegging and primary implantation surgery was 7.9 months (range 6 to 10.5 months). Enucleation was done in 8 and evisceration in 6 patients. 9 RE and 5 LE were operated. Commonest problem associated with pegging was spontaneous peg extrusion(3 cases) and conjunctival granuloma (1 case).

The average values of lateral, medial, superior and inferior movements of prosthesis before pegging and after pegging were calculated and expressed as percentage of similar movements of the normal eyes. Therefore for horizontal excursions the unpegged implants retained an average of 45.02 % of the movement of the normal eye, whereas for pegged ones it was 79.32 %. Similarly for vertical excursions the average value of unpegged ones was 40.18% and pegged ones was 54.58%. This represented a 76 % increase in motility associated with the peg for horizontal excursion. For vertical excursion it was 36 % increase (2).

The subjective evaluation was done through a response to a questionnaire by all 14 patients regarding the change in quality of their pre and post pegged lives marked as excellent, satisfactory and no change. 85.7 % showed an excellent response.

Table 2

No. of patients	Mean Horizontal excursion (unpegged)	Mean Horizontal excursion (pegged)	Mean Vertical excursion (unpegged)	Mean Vertical excursion (pegged)
14	45.02	79.32	40.18	54.58

DISCUSSION:

Eye movements are complex phenomenon comprising of vertical, horizontal, saccades and smooth pursuits. Attempts to measure the first two are done only as they are the easiest. Prosthetic motility depends on multiple factors like size, shape, weight of the prosthesis, as well as the size of the implants. Actions of the extraocular muscles are transmitted via the scleral capsule to tenon's fascia and conjunctival interface with the prosthesis.

Vertical excursions are not much influenced with pegging, which may be due to eyelid artifacts and shallowing or deepening of superior and inferior fornices in up and down gazes.

Selection of intraorbital implant type in this rehabilitation surgery is absolutely critical. Pegging seems to generate substantial increase in prosthetic motility. But contrary to previous assumption porous implants without pegging don't exhibit any superiority over other non-pegged spheres (3). Complications associated with pegging have also been reported like extrusion of peg, nonspecific conjunctivitis, audible click, granuloma at peg site, etc.(4)

This pilot study with an indigenous biosynthetic model showed a statistically significant increase in prosthetic motility, mainly in horizontal direction following pegging. But until patients are motivated for pegging, the use of porous implants are probably not really justified. The small size of the study sample does not permit to perform a comparative analysis with other types of implants and various operative procedures. Further evaluation in this regard will be necessary.

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