Photodynamic Therapy

This didactic lecture was presented by Dr. Atul Mishra on 7-9-2002 at Hotel Sri Radha over a dinner meeting sponsored by Ajanta Pharma - Ocugold Club.

Introduction

Average human life span is increasing, which is reflected in a mounting elderly population. On the lighter side, it is said that there are more people over the age of 60 living today on earth than the total number of all the people who crossed 60 since men came on earth 2 million years ago.

Today almost all elderly persons want to remain youthful. They want their bodies re-organized, reformed, re-juvennated or even re-erected at least in parts. Man refuses to accept the dictim of "Gracefully Growing Old".

In this fast market driven society he wants to fight the ageing effects. Under these circumstances, age related disorders of the eye, particularly those of the macula with their drastic impact on vision and quality of lifestyle, are receiving greater attention from those concerned with the health industry. Novel approaches are emerging to deal with this situation. These range from claims to check the ageing effect (and even to rejuvenate) to the prevention of age related macular degeneration (ARMD). However, at times these efforts are not only overdone, but also get illogical.

Often, the cost involved in these various modalities of treatment is tremendous, and bears its own impact, particularly if the quality of life is not improved correspondingly.

The concept of PDT came by observation in 1900, when Acridine selectively remained in paramecium and caused cell death after light activation.

Rationale of PDT

Photochemical injury to vessel wall and selective damage to the target tissue, sparing adjacent normal tissue.

Routing photocoagulation ablates both CNVM and NEURAL TISSUES with scar formation.

PDT - 2 components

1. Photsensitizer - The Dye
2. LASER light - corresponds to the absorption peak of the dye.

Dye - VERTEPORFIN - VISUDYNE (Ciba Vision)

- Supplied in 15 mg sterile lipid based freeze dried dark gree powder stored at room temperature in the dark.
- Benzoporphyrin derivative
- Binds to low density lipoproteins of the endothelial cell membrane of new blood vessels only.
- Activated only when low energy non thermal LASERis directed on the target area.

Technique

1. 6 mg/sq. meter body surface area (dosage)
    1. I.V. 30 ml solution in 5% dextrose in 10 minutes
    2. 5 minutes after infusion patient is taken for LASER
2. Pupil size
    1. Larger than the size of aiming beam.
    2. Macular contact lens for magnification is a must (we can not use the routine PRP lens, or we can use the wide angle macular contact lens)
3. Diode LASER at 960 nm (689 <> 3 nm) wave lenght is used
4. Intensity used 600 mw/sq. cm to deliver 60 J/sq. cm.
5. Duration 83 seconds on subfoveal CNVM
6. Spot size - IMPORTANT
    1. 1000 micrometer larger than GLD of CNVM (CNVM as per FFA + 1000 microns as safety margin)
    2. GLD = greatest linear diameter

Thermal effect is not immediately visible to the surgeon, develops one hour later. So, we don't know the end point fo the treatment.

Follow up

Three monthly with repeated FFA.

Average patients need 3 sittings per year.

Contra-indications

- Occult CNVM
- Liver disease
- Porphyria, sensitivity

Complications

1. Non-ocular -
    1. Extravasation of dye - III degree burn
    2. Pain, edema, hemorrhage at the site of the injection
    3. Sun burn
    4. Allergic reaction
2. Ocular
    1. Transient visual disturbances
    2. Short term visual field defect
    3. Vitreous hemorrhage
    4. Retinal CNP area

Recent advances

- PDT with sequential LASER
- Ran zeimer at Wilmer Institute developed this technique

- Two different lasers are used
- He uses photo-sensitive dye encapsulated in liposomes
- Argon to break liposomes
- Then diode for activation of the dye.

Other uses of PDT

1. Subfoveal CNVM due to other causes, such as myopia
2. CSR - leakage within 500 mu, one eyed, repeated CSR within 500 mu
3. Choroidal hemangiomas.