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Editorial

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Application of Laser In Neurosurgery

Laser has been a game changer in many sectors since its innovation. Medical application of laser began in 1960. The earliest studies suggested great therapeutic value. But this modality of therapy is not beyond controversy due to uncertainty of its mechanisms and lack of consensus protocols. Researchers studied the effects of hyperthermia and subsequent changes in brain tissue, meninges and tumor tissues in experimental models since 1980. The most destructive effect occurs at the closest proximity whereas distant areas receiving low energy cause bio-stimulative effect. Laser was first applied in open neurosurgical case in 1966; patients with malignant glioma.CO_2 laser, argon laser and Neodymium-dopped Yttrium Aluminum garmet lasers were experimented initially. Despite drawbacks, invention of novel energy transmission designs may lead to the introduction of highly controllable and precise laser beam in neurosurgery.

Arachnoid cyst can be treated with laser assisted endoscopic neurosurgery successfully. To create high flow bypass for cerebral revascularization, Excimer Laser Assisted Non occlusive Anastomosis (ELANA) is used to avoid stroke due to temporary occlusion and fewer distal end complication due to stability provided by metallic ring placement. Sutureless ELANA (SELANA) techniques was subsequently developed and being tested in USA. By using Trinity clip, end to side anastomosis can be established.

Laser induced interstitial thermal therapy (LITT) is used under MRI guidance to achieve selective thermal injury of pathological tissues while maintaining a sharp thermal border between tumor and normal brain tissue with Neoblate and Visualase systems. To treat epileptogenic foci, MRI guided LITT has been proved as an emerging technique. Hypothalamic hamartomas, cortical dysplasias, malformations and amygdohippocampal complex are targeted and showed good outcomes with low complication rate. In radioresistant cerebral metastasis with <3 cm lesioms, laser can be applied successfully. To achieve long term control of recurrent ependymoma, LITT was reported phenomenal which may replace / adjunct Gamma knife and Cyber Knife. In GBM it can provide with cytoreduction that foster drug delivery to remaining tumor cells increasing the efficacy of adjunct treatment options. MRI guided LITT may be offered as salvage procedure even after radiosurgery. Even in post radiosurgery cerebral edema with steroid refractory cases, LITT application has been studied. In glioma surgery, laser photodynamic therapy has created hope.

In Bangladesh percutaneous endoscopic assisted decompression was started by Professor Mohammad Hossain in 2011. Rational studies and accredited protocol development of laser application in cranial surgeries has been a dire need to keep pace with the dynamic world.

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