

THERAPEUTIC EFFECTS OF VARIANT WAVELENGTHS OF ND:YAG LASER ON BENIGN PROSTATIC HYPERPLASIA

Hypothesis / aims of study

We investigated the effects of a new Nd:YAG laser equipment on BPH (Benign Prostatic Hyperplasia), which is possible for using various wavelengths. The new Nd:YAG laser equipment developed for using two wavelengths (1444 nm and 1064 nm). A 1444 nm wavelength of Nd:YAG laser is similar to the tissue absorption of holmium laser, and a 1064 nm wavelength of Nd:YAG laser has high absorption rate in hemoglobin. In the rat BPH model, tissue resection and coagulation effect of these lasers in prostate was investigated.

Study design, materials and methods

Fourteen Wistar male rats over 13 weeks old were injected with 0.4 mg/100g of testosterone enantate through weekly subcutaneous injection for 4 weeks to cause benign prostatic hyperplasia and 7 rats were allocated randomly into 2 groups. Anesthesia was maintained through inhalation anesthesia to expose the prostate gland. For the first group, a 1444 nm wavelength of Nd:YAG laser was provided in the speed of 3 mm/s on the entire prostate gland and for the second group, a 1064 nm wavelength of Nd:YAG laser was provided using the same method. After the rats underwent exsanguinations, the prostate gland was enucleated. Hematoxylin-eosin dye was performed to examine the histological change of the prostate gland substrate and the resection depth from the prostate gland surface was measured.

Results

According to the histopathological examination, the first group showed tissue evaporation where the resection depth of the prostate gland resection surface is deep and the inflammation and denaturation of the surrounding tissue was small (Fig. 1). On the other hand, for the second group, tissue evaporation of the prostate gland did not occur greatly. However, tissue cauterization, such as inflammation, bleeding, and necrosis, occurred in the surrounding tissue (Fig. 2). The average resection depth measured from the prostate gland surface was 2.03 ± 0.18 mm for the first group and 0.94 ± 0.21 mm for the second group in which the first group was more attentively and deeply excised ($p < 0.01$).

Interpretation of results

The dual modes of new Nd:YAG laser equipment were also very effective in prostate tissue evaporation and resection like as KTP and holmium lasers used in BPH surgery.

Concluding message

For the 1444nm wavelength of Nd:YAG laser, the resection effect of the prostate gland tissue was excellent. Also, the 1064-nm wavelength of Nd:YAG laser has excellent haemostatic effects in the tissue. It is concluded, therefore, that by using this multi-wavelength laser in the resection surgery of benign prostatic hyperplasia, therapeutic effect and safety can be achieved at the same time.

Fig.1 Effects of 1,444 nm wavelength of Nd:YAG laser on BPH tissue (H&E, x100)

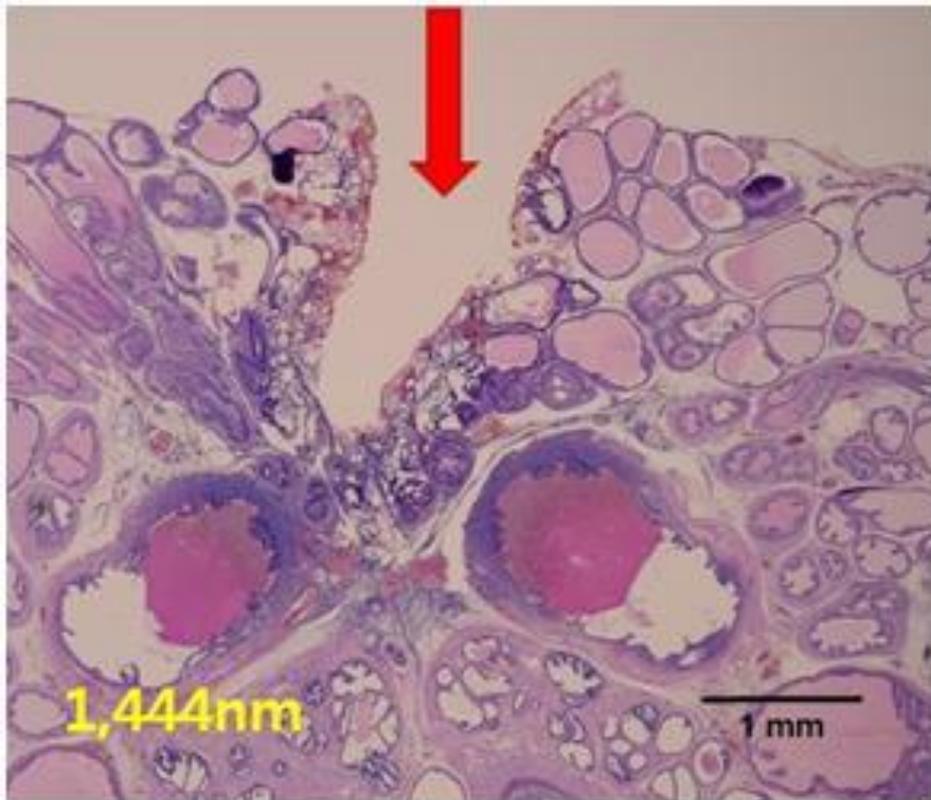
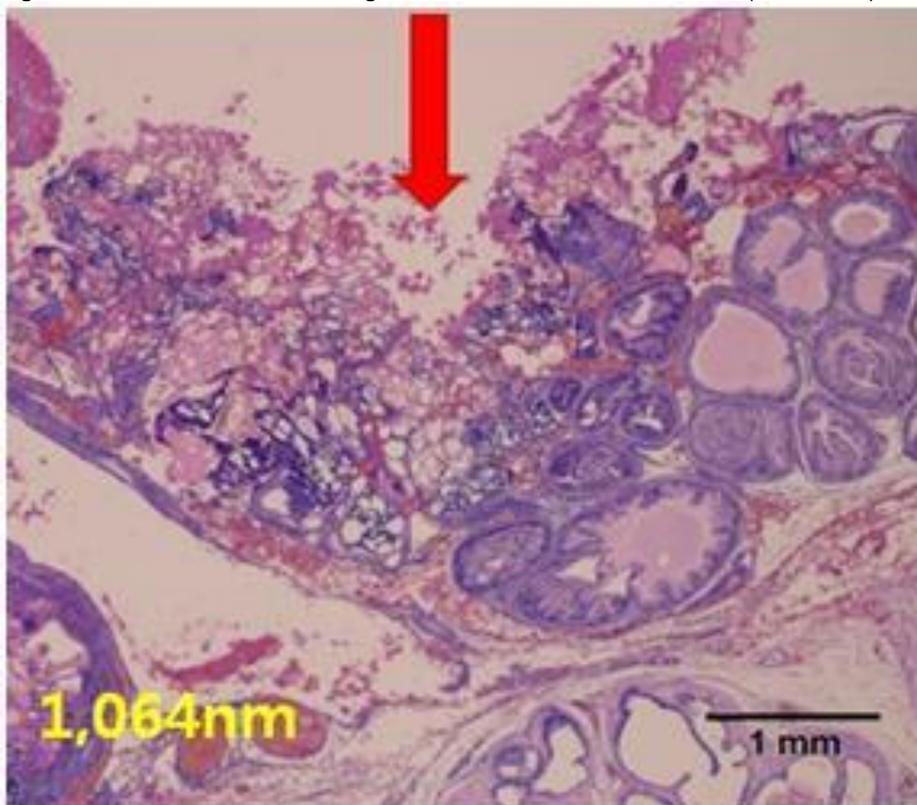


Fig.2 Effects of 1,064 nm wavelength of Nd:YAG laser on BPH tissue (H&E, x100)



Disclosures

Funding: None **Clinical Trial:** No **Subjects:** ANIMAL **Species:** Rat **Ethics Committee:** Kangbuk Samsung Hospital Institutional Review Board