0.97 and 1.56 µm lasers in treatment of degenerative-dystrophic bone diseases in children

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Abstract—Two laser technologies for treatment of degenerative-dystrophic bone diseases in children are presented: transcutaneous osteoperforation for aseptic osteonecroses and intracystic thermotherapy for bone cysts. There were applied a 0.97 µm laser in the first case and 0.97 and 1.56 µm lasers in the second one. Results are good in majority of cases.

Keywords— bone diseases, laser, aseptic osteonecrosis, bone cysts, osteoperforation, thermotherapy, pediatric surgery, children.

We present here two low invasive laser technologies for treatment of degenerative-dystrophic bone diseases in children. The first is transcutaneous laser osteoperforation developed by us and initially applied for treatment of acute purulent osteomyelitis [1,2]. The technology turned out to be rather effective in treatment of other bone diseases both inflammatory and traumatic: chronic osteomyelitides of different forms, osteal and osteoarticular panaritiums, delayed unions, false joints [3,4].

Now the technology was applied to treatment of aseptic osteonecrosis of different localizations in 145 children aged from 1 to 16 years, including 60 cases with necrosis of femoral head (Legg-Calve-Perthes disease), 45 with necrosis of 2nd metatarsal bone head (Kohler II disease), and 40 with necrosis of tibial tuberosity (Osgood–Schlatter disease).

The second technology is the laser intracystic thermotherapy for treatment of bone cysts. The method was applied to 120 children aged from 3 to 16 years with aneurismal and solitary cysts of different localizations.

The diode laser with optic fiber output with wavelength of 970 nm and maximum power of 30 W was used in both techniques. The laser action was carried out by means of silica-silica lightguide with a heat-resistant coating with a core diameter of 400 µm. In addition we applied a 1.56 µm fiber laser in the intracystic thermotherapy of bone cysts.

The methods aimed to stimulation of bone reparation are most pathogenetically justified in treating degenerative–dystrophic bone diseases. Our technologies using high-intensity near infrared lasers are quite appropriate to this task: the laser action in both cases, the intracystic thermotherapy and the osteoperforation, effectively stimulates the reparations. At the same time the technologies are minimally invasive and effectively induce elimination of pathological tissues (cyst lining, necrotizing bone). They enhance the effectiveness of treatment, reduce its duration, and allow us to conduct the treatment of most patients on an outpatient basis, which resulted in great economical effect.

All this gives us a reason to recommend the transcutaneous laser osteoperforation and the laser intracystic thermotherapy for widespread use in complex treatment of the patients with different osteonecroses and bone cysts.

REFERENCES