# QUANTUM THERAPY AS A HEALTH TECHNOLOGY OPTION IN MEDICAL MONITORING OF PRESCHOOL CHILDREN

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Reported evidence of the recent years indicates an important role of the lymphoid pharyngeal ring in control of respiratory and gastrointestinal mucosal immunity (1-5). The presence of the pharyngeal tonsil is a peculiarity of childhood, and its involution is due at the age of 15-16. The pharyngeal tonsil is a regional center which controls local mucosal immunity. According to the homing theory, the pharyngeal tonsil is the site of lymphocyte production for the nasal mucosa and paranasal sinuses. A peripheral immune organ, the pharyngeal tonsil supplies immunocompetent cells to the mucosa and controls the adequacy of the local immune response which is known as mucosal immunity.

Adenoid vegetations in children are caused by chronic mucosal inflammation and reactive lymphoid tissue hyperplasia which reflect a prominent humoral immune response. Adenotonsillar hypertrophy is seen as a consequence of chronic antigen stimulation.

The pharyngeal tonsil as an immunocompetent organ which mediates the local immune response of the nasal mucosa and paranasal sinuses. The onset of inflammation in the lower respiratory tract and its outcome (recovery/chronic progress) are dependent on the condition of nasal mucosal immunity.

The important physiological role of tonsils of the lymphadadenoid pharungeal ring in the immune mucosal barrier and its regulation dictates the need for an organ-sparing approach in management of tonsillar disease, especially in young children (4).

The terms adenoids and adenoiditis designate two different conditions. Adenoiditis is defined as chronic pharyngeal tonsil inflammation, while the routinely used term adenoids refers to simple hypertrophy of the pharyngeal tonsil. The tonsil as a part of the lymphoid ring may be acutely or chronically inflamed without hypertrophy. Its resection in chronic adenoiditis does not result in recovery, and its signs persist and recur. Since pharyngeal tonsil abnormalities vary, the management must be individualized.

Recurrence of adenoid vegetations after adenotomy is a major problem in pediatric otorhinolaryngology. Even the most careful resection of adenoid vegetations leaves them within the nasopharyngeal tissue because the vegetations have no capsule. The rate of adenoid vegetation recurrence after adenotomy has been reported to make a range of 4 to 75 percent, especially in children with a lymphatic constitution. Adenotomy is an invasive intervention harbouring complications like a nasopharyngeal bleeding, subcutaneous emphysema, meningitis and aspiration of the resected lymphoid tissue. Funally, operative treatment can distress the child and cause local immunity depression.

Therefore, important roles of the pharyngeal lymphoid tissue in immunogenesis and in upper respiratory tract immunity to infection suggest that extensive use of adenotomy as a sole intervention for adenoiditis in children is inappropriate. The search for new, sparing modalities is in order. If found, they would meet expectations of pediatricians, otorhinolaryngologists, immunologists, parents and educators.

## Materials and Methods

Of 804 preschool children examined by otorhinolaryngologists, 35.7 percent (n=282) had ear, throat and nose diseases. The rate of pharyngeal lymphadenoid hyperplasia was highest, with adenoid vegetations present in two-thirds of the patients. The vegetations had grade 1 in 40 children (14.8 percent), grade 2 in 59 (20.9 percent) and grade 3 in 1 (0.35 percent).

Examination of 1,233 primary school children revealed chronic ear, throat and nose diseases in 32 percent. The most common conditions were palatine tonsillar hyperplasia and inflammation, chronic pharyngitis, rhinitis, adenoiditis and otitis. A third of children had coexisting diseases: chronic tonsillitis and chronic adenoiditis, chronic rhinitis and adenoid hyperplasia, and other combinations.

We followed up for four years 196 children of 3 to 7 years of age with frequent acute respiratory viral infections and exacerbations of chronic adenoiditis, an index group.

Grade 1 pharyngeal tonsillar hypertrophy was diagnosed in 51 children and grade 2 in 145 children. Children with grade 3 hypertrophy were not included in this group, as any conservative methods are known to be useless in these cases.

Laser therapy was used in the index group and conventional methods such as adenotomy in 30 children which made up a control group. Our study also enrolled 30 episodically ill children for comparison of several determinants of upper respiratory mucosal immunity.

Local immunity was evaluated with methods which obviated the need for blood sampling, a procedure feared by parents and children. Lysozyme levels were measured in nasal secretions using a Dorofeichuk test (1968) and secretory immunoglobulin A concentations using a Mancini method (1965). Cytological studies of nasal mucosal smears used a Matveyeva method (1989).

Quantum therapy was carried out with a RIKTA-01 device which combines potentiating effects of pulsed infrared laser radiation with a wavelength of 890 nm, pulsed broad-band infrared radiation with a wavelength of about 900 nm, pulsed red light with a wavelength of 650 nm and a static magnetic field (induction, 40 mTl). The radiation dosage was a conventional 0.5 J/sq.sm. To consolidate the efficacy of quantum therapy, it was applied to the entire pharyngeal ring and regional lymph nodes, with the reasoning that chronic adenoiditis induces local secondary immunodeficiency of the upper respiratory tract mucosa.

Radiation was directed with a light guide 1.5 cm deep into nasal passages and onto palatine tonsils (exposure, 1 min; frequency, 50 Hz; pulse power, 4 W).

Contact transcutaneous radiation was delivered to projections of palatine tonsils, regional posterior cervical lymph nodes and projections of maxillary sinuses (exposure, 1 min; frequency, 50 Hz). The course was eight-ten daily treatments and was repeated at one month. Quantum therapy was combined with nasopharyngeal lavage, local immunocorrectors (IRC-19, ridoscin) and a bactericidal drug (bioparoxon). Laser therapy was controlled by followup of patient complaints, rhinoscopy and local immunity tests.

## Results and Discussion

Pediatric otorhinolaryngology is one of the most rewarding areas for quantum therapy because of the ability of laser radiation to improve microcirculation and because its antiinflammatory and antiallergic effects are fully recruited in the presence of pharyngeal disease.

There were no complications during therapy. Improvement was seen after four-six treatments in most of children, presenting as a better general well-being, less fatigue and return of normal sleep. Treatment results were compared with those in the control group which received a conventional treatment. In the index group, adenoiditis symptoms cleared in 81 percent of patients and the pharyngeal tonsillar size retracted to grade 1. Nasal breathing restored, rhinoscopic findings normalized and the acute respiratory viral infection frequency decreased from four-eight to two-three episodes a year. Therapy results were satisfactory in 14 percent of children. Disease symptoms markedly abated, nasal breathing dramatically improved and local immunity tests showed a positive change. Laser therapy was ineffective in only 5 percent of children. The lack of response presented as persisting severity of earlier symptoms of chronic adenoiditis; additional studies revealed respiratory chlamydiasis in these patients.

Analysis of pretreatment nasal cytograms showed that chronic adenoiditis was associated with significant cell abnormalities. Typical findings were an abundance of coccal flora and neutrophils, and high destruction of of columnar epithelium cells. Upper respiratory mucosal immunity is mediated by segmented neutrophils migrating from the vascular bed. In preschool children with chronic adenoiditis, neutrophil exudation to the nasal mucosa surface was excessive, but neutrophil functional activity was found to decrease to 0.01 +- 0.005 as against 0.04 +- 0.1 in children with episodic disease. The low neutrophil functional response can facilitate chronic progress of nasopharyngeal diseases. Quantum therapy, which has a membrane-stabilizing effect, helps local repair of the respiratory tract mucosa and, through the immunomodulating effect,

influences systemic immunity, thereby reversing or mitigating chronic adenoiditis and reducing the relapse rate.

Quantum therapy activated nonspecific immune mechniasms of respiratory tract, as it was suggested by return of spontaneous granucolyce phagocytosis to a normal 0.08 +- 0.06. Neutrophil counts, lysis, activity and destruction were in a positive range.

Followup of frequently ill children with chronic adenoiditis after quantum therapy has shown its effecacy in induction of respiratory tract immunity. Table 1 presents change in local immunity.

**Table 1. Pattern of change in respiratory tract local immunity in 3- to 7-year-old children with frequent respiratory infections and chronic adenoiditis after quantum therapy (mean ± SD)**

| Time | Values | |
|---|---|---|
| | **Lysozyme (%) n=196** | **SIgA (g/l) n=196** |
| Before treatment | 54.9 ± 1.73 | 0.16 ± 0.01 |
| at 10 days | 67.4 ± 2.2 | 0.23 ± 0.01 |
| at 1 month | 65.3 ± 2.8 | 0.23 ± 0.03 |
| at 3 months | 63.3 ± 2.05 | 0.20 ± 0.03 |

Nasal secretory lysozyme concentrations steadily increased starting from initial days of therapy. Their values remained optimal for three-four months, after which the muramidase level declined to its initial low.

Secretory IgA levels were reflective of the general trend: they were abnormally low before quantum therapy, grew during the therapy and decreased at four months following therapy.

Therefore, a high level of specific upper respiratory musocal immunity induced by quantum therapy appeared to reduce pharyngeal tonsillar inflammation. It also curtailed the frequency of respiratory diseases in preschool children 2.8-fold within initial three-four months after therapy.

Since clinical and immune stabilization lasts for four months after quantum therapy, repeat courses were carried out at three months.

Effectiveness of conventional treatment of chronic adenoiditis in control preschool children with frequent respiratory infections was lower. Results were good in 32 percent of the patients, satisfactory in 51 percent and poor in 17 percent.

A followup of quantum therapy results at one month showed a good clinical response to last in 80 percent of children and to be satisfactory in 13 percent. Chronic adenoiditis relapsed after an acute respiratory infection in 7 percent. In the control group, a good effect of therapy was seen at one month in 25 percent, satisfactory in 58 percent; the effect lacked in 17 percent.

A followup examination at one year showed good and satisfactory results to keep in 85 percent of cases; chronic adenoiditis relapsed only in 15 percent. In the control group, good therapy results lasted in 34 percent of children, while chronic adenoiditis was seen in 66 percent.

## CONCLUSIONS

The important physiological role of pharyngeal lymphadenoid tonsils in musocal immunity and its regulation dictates the need for an organ-sparing approach to management of tonsillar disease. High effectiveness of quantum therapy of children with lymphadenoid ring disease commends it as a health care option. Quantum therapy had a prolonged effect on local immunity and significantly reduced respiratory infection recurrence in children. The rational use of quantum therapy and its prominent efficacy in children with frequent respiratory infections and chronic adenoiditis allows to obviate adenotomyin in many cases.

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