

Replacing Scalpel by Laser in surgery makes costreduction

That shows prostate therapy

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Europe is leading in superanuation worldwide (1) . Old people have problem because they need more medicine but have decreasing income to pay it. Last Ageing Report of European Commission shows in 2060 the Senior Quotient doubled and 4,75% more in GDP; realistic - social contribution of every employ will be above 40% of his wages. **Lasermedicine can help to deactivate this <senescence time bomb>.** Here german data: 81 million had 1996 one newborn to ten over 65 y old people. Now 1000 inhabitants have 7 newborn, every 4th man is over 60y and 50%or 5 000 000 have prostate problems. Place Nr1 in male tumor statistic are 60 000 new Carcinoma of Prostate / year (CaP) followed by urotheltumor on place3. Threatening is increase of malignancy everywhere; e.g.China statistical Year-book 2008 (TIME) reported 28%cancer-death (D 2012 26%=220000). As long as healing of tumours depends on scalpel, radiation and drugs with soaring prices - it's an economic problem.



Urology is an old profession. We know a colleague, his name, work and instruments from a rich Egyptian tomb of the middle dynasties. **Since that time only relieve for prostate pain was daily bladder catheterisation until Freyer published in Lancet 1901 his operation – after anesthesia ennobled painles surgery.** Urologists dreamed to use natural urinary channel system for diagnosis and therapy. First step was **to enlighten bladder, realized 1871 by Nitsche cystoscope/Charité** with a concave ophthalmic forehead-mirror and candlelight via a metallic tube. Parallel colleagues in Pisa tried electro-coagulation pushing transurthral an isolated copper wire until obturation stoped it and burned tissue. Combinig both ideas 90 years ago small electrobulbs and rodoptics in Nitsches instrument along with electrotomes enabled

transurethral resection of prostate. **This TURP became after invention of glas fibres and transistors 1970 standard** and all kinds of waves were tested under the aspect to replace TURP. Laser is leading now.

Short to laserhistory: Einstein declared materia is immense energy($E=mc^2$). **500gr Uranium proved it in Hiroshima 1945.** At zero-point people were drawn into the pavement whitout bones left behind. That lead to **lasertheory simultaneously 1954 in Russia by Prochorow and USA Gordon/ Townes.** Since **first lasertool 1961** energy increased from Mini Watt to hundreds Watt in 30 000 wave-lenghts and 100000 maintenance-free hours while size decreased from wardrobe to pilot case whit price still sinking. Russian used from beginning laser for therapy of diabetes, hypertony a.s.o. called LLLT - with good results and low costs. Now 8200 laserdocs work in 30 500bed laserclinics. Germany preferred pharmacy. **Pogress in technology enabled high-power laser - thus surgery (HLLT) - and Steve G.Bown (4) lasered first liver-tumor 1983.** Core is the use of glass fibres for coagulation, carbonisation, cutting, vaporisation and atomic photo ablation that makes cutting, sawing, planing and drilling in tissue and bones. Besides this **<multitool-function laserscalpel>** measures now in reflected beam at Moscow Carcinoma Center when you come in or out of tumour and they try a lasersceptroscopic diagnosis by Raman effect. **All that makes a paradigm shift in surgery possible.**

Because costs are the pinpoint in all social budgets two pictures. Otable shows how many instruments are used in <inguinal scalpel incision>. It must be cleaned, sterilized, a.s.o and put fast into surgeons hand.



For same operation here less material - but laser. Important is reduced bleeding, pain, infection a.s.o.This relieve of torture together with timesaving multitool function most surgeons don't know. **A new 980nm50W Diodelaser enabled since 1996 all trans-urthral surgery and step by step 96% of scalpel surgery.** That decreased our expenses to 45% of pre-laser era.

This needle-holder of a high tec 4-branch mechanical surgical robot unit could be the top of longest Kondratieff Cycle with thousands years old mechanical instruments. **In 2009 80% total prostatectomy in USA were performed with it.** Well US-health system gets 19% of GDP to carry costs :1.5million € the tool, 70 000€ training every colleague and 350 000/y for maintenance service - in every hospital. Alas that's not everywhere possible.



Back to urology. **Innovation has its price.** Single use products like mull, sutures, drainage a.s.o. for Freyer cost about 5 Euro; they raised to 50 € in TURP by precious platin loops and soared once more tenfold for heat therapy. These higher expenses are barrier for general application - better said progress. **Hofstetter (2,3) reported first prostate laser operation 1991 as ILCP with 20W-NdYAG and special ITT fibres.** This proceeding stopped soon. We believed costly special fibres were the reason and changed to „sales bare fibres.“ **Since 1988 we lasered lege artis with 0,6mm resterilized bare fibres,** a NdYAG

Siemens Medilas 100 and small 17,5 Charr. Olympus urethroscope via the straight guide tube very cheap **more than 4000 bladder tumours, urethrastrictures a.s.o. Same simple set enabled us 1993 SUPERFICIAL COAGULATION of prostate.** (5,6,7,8)1000 Joules with 40 W-NdYAG cw and non contact mode are beamed into every treatment point at the surface of adenoma in a grid of about 5mm. **Reusable fibres decreased costs/OP from about 500 USD to 1 USD and we were faster as with ILCP.** Real problem was publishing this experiment.

At the 7th Video Urology World Congress/Antwerp June 1996 we could publish first results. Big adenoma need more sessions because parameter mentioned before make a 5-8mm diameter coagulation cylinder with a depth of about 1,4 cm and good voiding returns slowly because tissue is not removed. In 391 cases we found besides fever 7X hematuria and 4X unexpected urinary retentions by necrotic material 3-6 weeks later. **This was the lowest complication rate we ever had.**

We looked for improvement. Please see - we got other cons. **INVASIVE COAGULATION (Blue)** that's pushing fibre into depth of adenoma and drawing it back slowly. **CUT-TING(Red)** Fixed hot fibre-tip in urethroscope works fast as scalpel in all directions. After these results we made since 2001 always first coagulation to minimize bleeding followed by cutting to reduce burned tissue; so complications dropped once more and procedure was published on 54 congresses.

To look forward here: Minimal invasive surgery of abdomen with ports is performed the same way – why not together with laser.

All complications after PLO in 1296 cases (1.10.1994-30.11.2000)

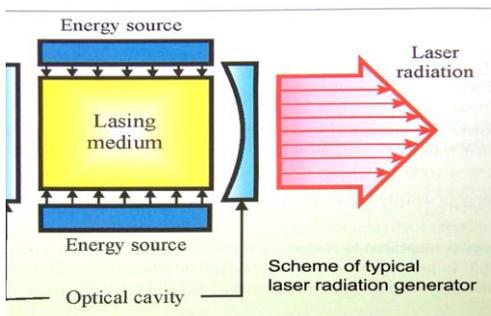
Typically after *invasive coagulation*© or **cutting(X)**

- 171 fever (only above 30000 Joules energy)
- 81 pain (supra pubic region – on request catheter I)
- 39(X) **bleeding-using electro-coagulation** (9x 2nd narcoosis)
- 29 epididymitis
- 14© **urinary retention** (by mass of necrotic tissue / 3-6 weeks after op)
- 5(X) **blood-transfusion**
- 4 supra pubic catheter problems (2 bleeding, 1 abscess, 1 peritonitis)
- 3© **Systemic Inflammatory Response Syndr.** (1 dead)
- 2© **periprostatic abscess** (1x seen in scan, 1x transrectal incision)
- 1 stricture of bladder neck, gear-defect NdYAG

All endoscopes enable in subspecialities to treat like us their <channel system>. Otherwise without visual control but by aid of modern imaging systems and „Seldinger puncture“ our fibres can reach within small double tube-sucker nearly any spot in the body and we can laser exactly the area. Drainage after enables photo-dynamique therapy or more sessions. That we should try especially in geriatric oncology and why not with handy robots worth the money. **But also the 3th World could profit to come directly to up to date surgery without passing last century developed now obsolete methods.** Back to prostate: **laser surgery was no challenge to TURP (.9,10,11,12) until Malek & Kuntzman/Mayo Clinic made with 80W-KTP-laser 1998 efficient vaporisation (PVP) (13,14).** High energy disrupts tissue to microscopic particles. Material vanishes bloodless under a curtain of small bubbles and new soil with normal anatomical structures results. New diodelaser vaporize even faster. **2011 in USA 80% of all benign prostate enlargement operation were PVP – mostly as outpatient therapy. It is standard now (15). Dec.2012 French <Progrès en urologie> declared PVP for all BPE sizes and anticoagulants as first choice.**

But could this proceeding help us in booming CaP too? Several reports like Sanchez-Chapado(16) - from 60 men dying below 40y by accident had 9 adenocarcinoma or HGPIN - let us guess early malignant cell population make early systemic disease. So we propose here until we have causal therapy for benign and malignant prostate enlargements at first symptoms after completed family planning a PVP under sonographic visual control. We can expect more „oldies“ without prostate symptoms and less cases of ailing CaP later .

To come to end: „HLLT“ can help any surgeon e.g. laserfriends in Dhaka/ Bangladesh. In this house they performed 4500 cases of Percutaneous Laser Disc Depression (PLDD) at lumbar, cervical and thoracic inter-vertebral disc prolapses in 4 years (Cong. report Laser Helsinki 2010). Or as Congress report 2012 in Australia an innovation (cite. Dr. Ali) „23 cases of Core Decompression by Laser Osteo-perforation as minimal invasive modality for treatment of avascular necrosis of femoral head“.



To summarize: in this millennium surgery comes into Einstein's universe. But for most of us it's still <bloody surgery> because tools are in form and function the same since stone age ; even "operating by wire" with mechanical robots connected to the operators laptop by internet hundred miles away make no paradigm shift. Doctors oath to help his next is valid since thousands years and combined with everlasting duty to use all innovations to make good work and get better results for a price our patients can afford. Laser enable that on any plug in mega clinics as well as disaster relief in a tent

or hut that shows a RedCross/-Halve Moon on the wall. Thus surgeons can reduce costs for society and torture of the patients on this globe - as long as we have no better solution.

But what's on pipe concerning lasers and medicine? Another dream of mankind: to destroy tissue in body without touching the skin! In PHOTONICS - Fraunhofer Zentralinstitut Dresden reported a new proton laser called Draco – You find in net under „www.fzd.de „. It is tested in OncoRayCenter University Clinic Dresden. You know protons pass tissue of our body without known damage but finally they stop and vanish by generating heat. That phenomenon can be exactly targeted in tumours. Revolution is, in Large Hadron Collider CERN 2012 x boson („Higgsparticle“) was found – now greek atom (material / „mass“) is all pure energy – well change is permanent. Thanks for Your attention.

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