Göteborg, 2021

Transurethral microwave thermotherapy and transurethral resection of the prostate
Evaluation and development

Akademisk avhandling

Som för avläggande av medicine doktorsexamen vid Sahlgrenska akademin, Göteborgs universitet kommer att offentligen försvaras i Hörsal 2119, Hus 2, Hälsovetarbacken, den 21 maj, klockan 09.00

av Fredrik Stenmark

Fakultetsopponent:
Pernilla Sundqvist, Associate professor
Örebro University

Avhandlingen baseras på följande delarbeten

I. Stenmark F, Brudin L, Stranne J, Peeker R. High-energy feedback microwave thermotherapy and intraprostatic injections of mepivacaine and adrenaline: an evaluation of calculated cell kill accuracy and responder rate. *Scand J Urol*. 2014;48(4):374-8.

II. Stenmark F, Brudin L, Kjölhede H, Peeker R, Stranne J. Prostate volume and age are predictors of energy delivery using the CoreTherm Concept in patients with LUTS/BPO: a study on thermal dose. *Scand J Urol*. 2020;54(3):248-52.

III. Stenmark F, Brudin L, Kjölhede H, Peeker R, Stranne J. Transurethral microwave thermotherapy in 570 patients with prostate volumes of 80-366 ml: an evaluation of short- and long-term efficacy. *In manuscript*.

IV. Stenmark F, Brudin L, Gunnarsson O, Kjölhede H, Lekås E, Peeker R, Richthoff J, Stranne J. A randomised study of TURP after intraprostatic injections of mepivacaine and adrenaline versus regular TURP in patients with LUTS/BPO. *In manuscript*.

SAHLGRENSKA AKADEMIN
INSTITUTIONEN FÖR KLINISKA VETENSKAPER

GÖTEBORGS UNIVERSITET

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Transurethral microwave thermotherapy and transurethral resection of the prostate
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Fredrik Stenmark

Avdelningen för urologi, Institutionen för kliniska vetenskaper, Sahlgrenska akademin, Göteborgs universitet, Sverige, 2021.

Lower urinary tract symptoms (LUTS) are common among men and become more prevalent with increasing age. One frequent cause is benign prostatic obstruction (BPO). Patients with LUTS/BPO can be ameliorated if the obstructive tissue is removed. The surgical reference methods are transurethral resection of the prostate (TURP) in prostates 30-80 ml, and transvesical (or transcapsular) adenoma enucleation (TAE) in prostates >80-100ml. An outpatient alternative to TURP and TAE is transurethral microwave thermotherapy (TUMT).

In **Paper I**, we evaluated the accuracy of calculated cell kill (CK) using advanced TUMT, the CoreTherm Concept (CoreTherm®, ProstaLund AB, Lund, Sweden). A total of 278 treatments were retrospectively analysed. It was apparent that CK calculated by the software during treatment underestimated the actual prostate volume reduction. For prostate volumes <100 ml before treatment the prostate volume reduction measured by transrectal ultrasound (TRUS) was 26% ($p=0.003$), and for prostate volumes ≥100 ml the prostate volume reduction measured by TRUS was 31% ($p<0.001$). **Paper II** was a study with the primary objective of evaluating pretreatment parameters in order to estimate an appropriate thermal dose for each case. It was evident that energy delivery was correlated to prostate volume ($p<0.001$), the larger the prostate, the more energy was needed to achieve the desired volume reduction. The study also showed that age correlated to energy consumption ($p=0.01$), where older men required less energy, despite having the same prostate size. Consequently, it is possible to calculate the thermal dose before treatment and use this as an alternative treatment endpoint. In **Paper III**, the short- and long-term efficacy of the CoreTherm Concept and CoreTherm in prostates ≥ 80 ml were evaluated in 570 patients. Patients treated 1999-2015 were included and followed up until the end of 2019. A total of 17 patients (3.0%) were retreated with TAE and 54 patients (9.5%) with TURP. The conclusion was that the CoreTherm Concept is a valuable outpatient option to surgery for patients with large prostates. **Paper IV** was an open, prospective, controlled, randomised multicenter study of transurethral resection of the prostate (TURP) after intraprostatic injections of mepivacaine and adrenaline (MA) versus regular TURP in patients with LUTS/BPO. The primary objective of this study was to determine whether injections of MA, administered via the Schelin Catheter™ (ProstaLund AB, Lund, Sweden) before and during TURP, reduced perioperative bleeding. The results indicate that it might be beneficial to apply intraprostatic injections of MA in conjunction with TURP, although further studies are deemed necessary.

Keywords: TUMT, CoreTherm, the CoreTherm Concept, TURP, adrenaline

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