

EAU Expert Meeting at UROtech24 focuses on ESWT

Key opinion leaders discuss technologies, indications, and application modes in urology



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On 27 January 2024, another EAU Expert Meeting organised by the EAU Section Office took place in Vienna during UROtech24. This time, the EAU Section of Urotechnology together with the EAU Section of Andrology prepared the programme which focused on the role of extracorporeal shockwave therapy (ESWT) in urology. They also invited the German speaking Society of Shockwave therapy (DIGEST), the German Society of Shockwave Lithotripsy and Therapy (DGSWL), and the International Society of Medical Shockwave Therapy (ISMT). The meeting was supported by four manufacturers of shockwave devices: ELvation Medical, EMS, MTS Medical, and Storz Medical.

The faculty of the EAU Expert Meeting comprised of leading voices in the field and representatives of the aforementioned manufacturers. The meeting's primary objective was to engage in discussions about various technologies, indications, and application modes of ESWT in urology. It aimed to serve as an interactive platform for the exchange of ideas, featuring state-of-the-art lectures by key opinion leaders (KOLs) in urology and andrology, as well as by experts from other specialties such as orthopaedics, surgery, and neurology. Additionally, manufacturers of shockwave devices presented their insights (Fig. 1). This article summarises the main topics covered during this exciting event.

Dr. Wolfgang Schaden (AT) summed up the existing knowledge on the biological effects of shockwaves on biological tissue. In contrast to direct mechanical destruction as known from lithotripsy, the biological effect of shockwaves requires significantly less energy density as basis of mechanotransduction with subsequent stimulation of angiogenesis, modulation of inflammation, and even stem cell activation in the respective tissue (Fig. 2). One of the most dramatic recent findings represents the stimulation of the infarcted heart tissue by a single intraoperative shockwave session during coronary surgery.

Prof. Hartmut Porst (DE) presented eight devices for ESWT (Fig. 3). Firstly, he explained the technological differences of shockwave generation (i.e., electrohydraulic, electromagnetic, piezoelectric, and ballistic) and focused on use of various applicators. He emphasised that his patients experienced different pain levels among the devices, even when similar energy densities were applied. Moreover, he compared the weight of the different handles which may become cumbersome for the urologist applying the shockwaves. Finally, he focused on two new devices combining different shock technologies, such as the BTL 6000 (electroacoustic/electro-



Fig. 1a: EAU Expert Meeting on Extracorporeal shock wave therapy in Urology; presentation of all main topics



Fig. 1b: Participants of the EAU Expert Meeting

magnetic and piezoelectric) and DUOLITH SD1 T-TOP »F-SW ultra« & MASTERPULS MP100 (electromagnetic and radial).

Prof. Georgios Hatzichristodoulou (DE) presented the state-of-the-art of ESWT in urology starting with well-known indications such as erectile dysfunction (ED), Peyronie's disease (PD), and chronic pelvic pain syndrome (CPPS). Then he proceeded to presenting recent studies on the beneficial effect of shockwaves on patients suffering from lower urinary tract symptoms (LUTS), testicular dysfunction, and wound-healing problems after Fournier's gangrene. Prof. Hatzichristodoulou concluded that there are many indications for ESWT in urology mostly with good and robust data in literature and many research activities worldwide. However, several questions still need to be addressed with more well-designed clinical studies focused on the exact parameters and schedules of ESWT to find out the ideal treatment protocol for the respective indication.

Dr. Angelo Di Giovanni (IT), Prof. Porst, and I presented the current situation of ESWT for PD that there is a lack of RCTs that better defines the effect of ESWT on pain (i.e., in the acute phase of PD) as well as on the improvement of penile deviation and subsequently on sexual intercourse. I emphasised the use of higher shockwave energy even by using a classical lithotripter under local anaesthesia in case of hard plaques leading to a mechanical destruction at least for one or two sessions (Fig. 4). Prof. Porst pointed out the variations in the clinical appearance of ED that he observed in his vast series of patients who required individual treatment protocols even with the use of different shockwave technology (combining electromagnetic with piezoelectric). This might be a problem when designing study protocols for PD. He emphasised the additional use of tadalafil to decrease the oxidative stress responsible for inflammation and fibrosis.

Dr. Igor Motil (CZ) reported on the current scenario of ESWT for vasculogenic ED. He emphasised the

importance of a tailored treatment approach for patients based on possible underlying comorbidities, as well as, precise pre-treatment diagnostic evaluation of vasculogenic ED. He expressed that there should be an effort for the further standardisation of the shockwave parameters among the different devices.

Dr. Michael Strøm (DK) reported on the present situation of ESWT for vasculogenic and postoperative ED. Based on existing evidence, there should be further standardisation of the shockwave parameters among the different devices. Also, after radical prostatectomy, there are already meta-analyses in the literature supporting the use of ESWT. Additionally, Dr. Strøm showed first promising results combining ESWT with extracorporeal electromagnetic transduction therapy (EEMT) for this indication.

Prof. Nikolaos Sofikitis (GR) summarised the current role of ESWT in the EAU Guidelines (Fig. 4). According to the EAU Guidelines Panel of Sexual and Reproductive Health, there are still several concerns concerning the presented data on ESWT. This affects the heterogeneity among shock wave generators (i.e., electrohydraulic, electromagnetic, piezoelectric and electropneumatic); the type of shockwaves delivered (i.e., focused, linear, semi-focused and unfocused); the set-up parameters (e.g., energy flux density and number of pulses per session); and the treatment protocols (i.e., duration of treatment, number of sessions per week, total number of shockwave pulses delivered and penile sites of application). Based on existing RCTs, ESWT is only recommended for the management of pain in the acute phase of PD. This means, that there is a great demand on further well-designed study protocols.

Dr. Hannes Müller-Ehrenberg (DE) presented the recently published DIGEST Guidelines on the use of ESWT in medicine. For urology, guidelines for management of PD, ED, CPPS, micturition symptoms in benign prostatic obstruction (BPO), and promotion of wound healing after Fournier's gangrene are included. According to the structure of the DIGEST Guidelines, recommended treatment protocols are already included. Dr. Müller-Ehrenberg also emphasised the interdisciplinary collaboration

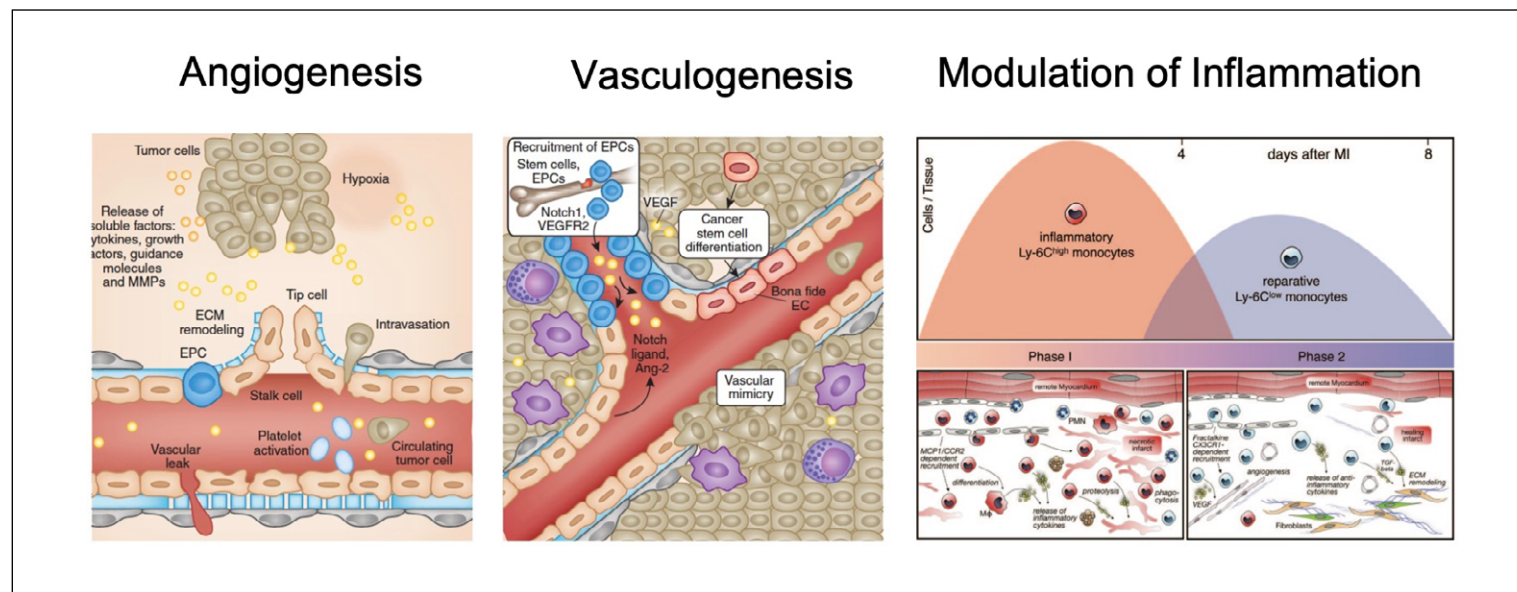


Fig. 2: Biological effects of low-energy shock waves based on Mechanotransduction

with regard to the CPPS (i.e., by including myofascial trigger points).

Dr. Grzegorz Fojecki (DK) started with a historical overview of the use of ESWT for CPPS. Basically, all types of shockwave devices have been successfully used. However, there is a dramatic difference in respect to the applied shockwave energy. Finally, Dr. Fojecki mentioned the first clinical trial in the treatment of dyspareunia by perivaginal shockwave therapy.

Asst. Prof. Ioannis Sokolakis (GR) summarised the existing results on ESWT for LUTS. He showed that the experimental and first clinical studies demonstrated the beneficial effect of ESWL on overactive bladder, but also on BPO. He also mentioned a few studies on the effect of ESWT on stress urinary incontinence. Nevertheless, further studies on this topic are needed to establish the role of ESWT as a possible treatment approach in patients with LUTS.

I provided an update on a series of eight cases from two centres who had their Fournier's gangrene

treated following complete excision of the infected tissue. It was observed that following primary reconstruction with wound dehiscence, secondary surgery could be avoided. Prior to placement of a skin graft, the area of the wound could be significantly reduced. In two patient cases, surgery was not necessary. The fact that the wound was closed by the respective tissue (penile skin, scrotal skin) indicated a stimulation of stem cells by ESWT. However, more studies in this field are necessary.

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Finally, Dr. Martin Ringeisen (DE) presented the educational concept of DIGEST with the aim to certify doctors as shockwave therapists. In urology, this would be easier to accomplish since they are usually well trained to use a lithotripter.

Following a technical overview of Prof. Porst, all four participating manufacturers presented their recent developments.

Mr. Phillipe Gilmer (CH) presented the state-of-the-art of radial shockwave technology. He emphasised that for several orthopaedic indications (i.e., chronic plantar fasciopathy), the effect of radial shockwaves were similar to those of focused shockwaves. The same applied to studies on ESWT for ED. The main reason might be that the treatment focus was subcutaneous. Future study should focus more on the exact underlying mechanism of action.

Ms. Mirjam Mayer (DE) presented the entire portfolio of the Richard Wolf / Elevation lithotripters / shockwave devices. The basic technology represents a double layer of piezoelectric crystals in hemispheric arrangement. Thus the device can be modified according to the indication: Linear-focused and large focal volume for ED; an elongated focal zone for deep-seated structures in CPPS/CBSS therapy; powerful and large-volume as well as precise and light for PD.

The linear focus zone is unique, it provides 20 mm of penetration depth over a length of 46 mm with a maximum frequency 12 Hz.

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Mr. Ingo Ferrara (Taegerwilen, CH) presented the history of Storz Medical starting with the Modulith for ESWL up to Duolith SD for ESWT. Here the basic technology represents an electromagnetic cylinder focusing the shock waves by a parabolic reflector. Additionally, the company has the Masterpuls for application of radial shockwaves. Storz Medical produces devices for several fields in medicine (urology, orthopaedics, neurology, cardiology, dermatology, traumatology, veterinary). Recently, they presented the first device, Neurolith, for transcranial ESWT in cases of Alzheimer's disease. Additionally, they have developed the Magnetolith for extracorporeal electromagnetic transduction therapy (EMTT).

Ms. Sarah Engel (DE) presented the Urogold 100, a device which uses electrohydraulic shockwaves.

The change of the ellipsoid reflector allows modification of the focal zone and penetration depth. She presented two large studies on the successful application in case of PD and ED. Interestingly, Goldstein et al. were able to demonstrate the recovering of the cavernosal tissue by penile ultrasound.

The EAU Expert Meeting concluded with a lecture by Dr. Karsten Knobloch (DE) on the future of ESWT with new indications, combination protocols, and the use of artificial intelligence (AI). Not only dyspareunia, but also other gynaecological diseases such as endometriosis or even fertilisation may become a future indication for ESWT. Nephrologists may use ESWT to improve renal function in kidney fibrosis due to its anti-fibrotic effects.

The first results of combining ESWT with EMTT are promising, including in the field of urology for ED and CPPS. The combination of stem cell injection with ESWT proved to be superior to each modality alone in animal trials. AI might help optimise energy levels \pm number of shots for distinct indication and enhance our knowledge when comparing various treatment parameters. Based on this, there were several discussions on topics for further meetings and study protocols (i.e., comparing ESWT for acute PD versus a standard treatment; comparing different protocols of ESWT for ED). All participants agreed to further collaborate.

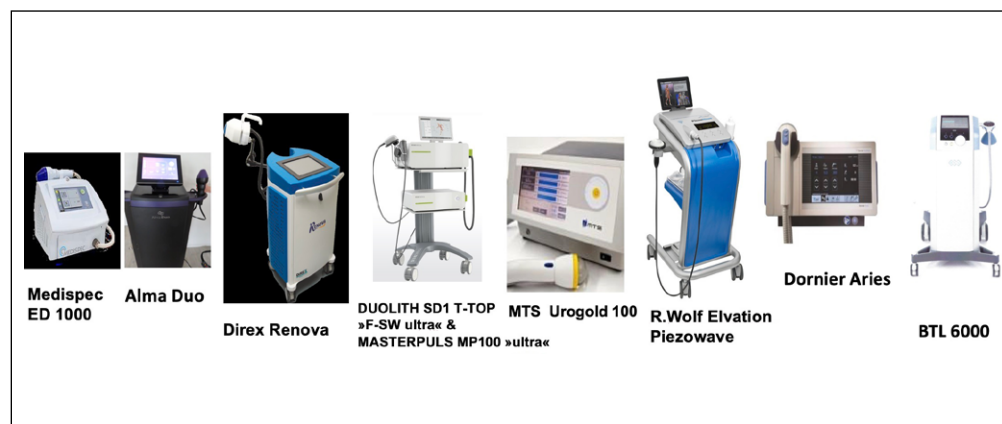


Fig. 3: Different devices for ESWT

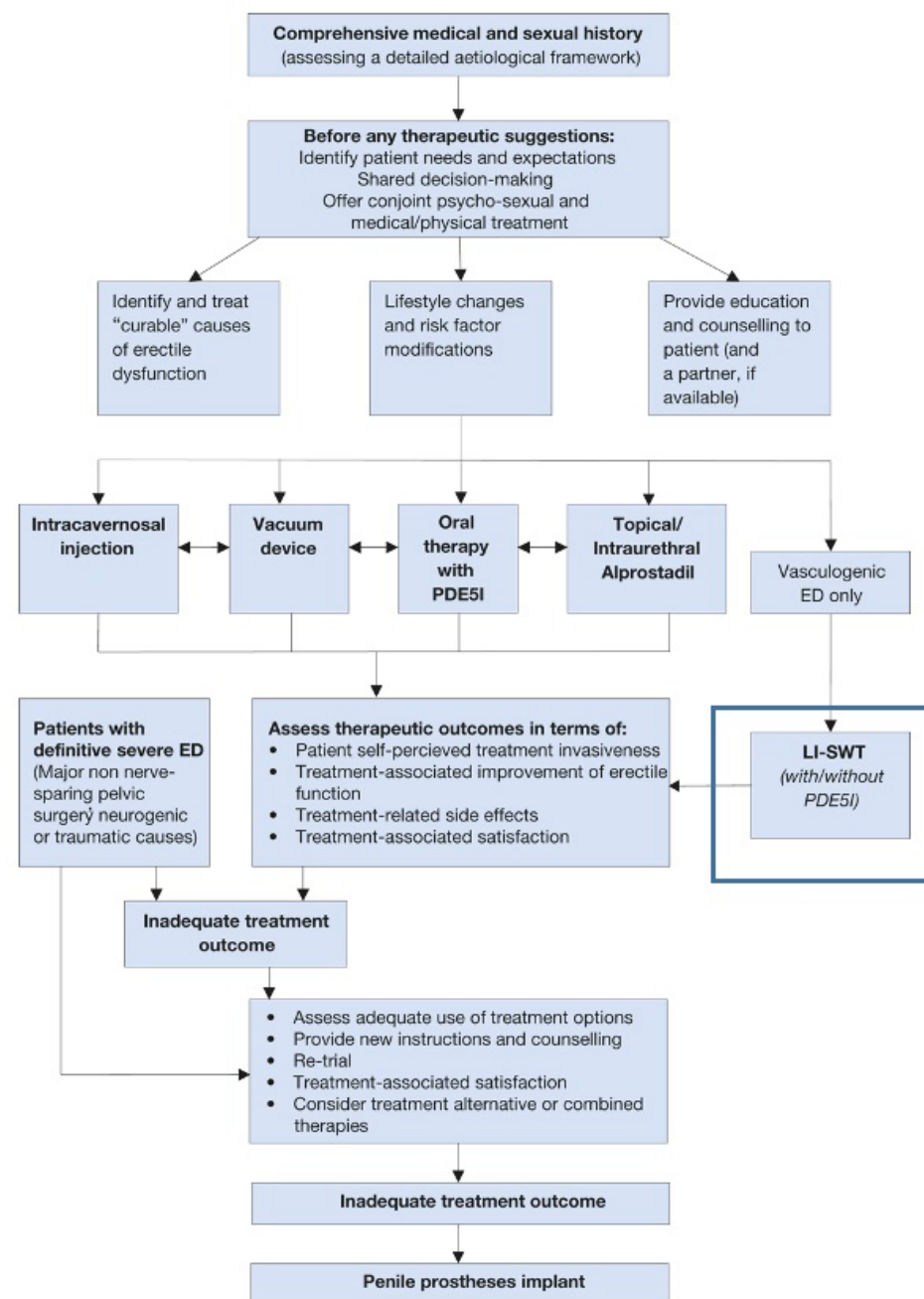


Fig. 4: Role of ESWT in the management of erectile dysfunction in the 2023 EAU Guidelines