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Aims & Scope
Editorial Board
Abstracting - Indexing
Author Guidelines
Journal Content
Sitemap

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Full paper

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Y. KARAASLAN

Derivation of Environmental Quality Standards by Ecological Risk Assessment Approach Using AQUATOX Model

Full paper

C. ATALAY, E. OLHAN, Y. ATASEVEN

Evaluation of Environmentally Oriented Attitudes of Organic Food Consumers with the New Environmental Paradigm Scale: a Case Study of Ankara

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A. S. HILA, Z. FERENCZ, L. DIMEN, T. BORSAN

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Full paper

K. Z . ONKOV, G. K. TEGOS

Changes on Fish-Species-Catch Statistical Information in Greece and Effects on Studying Species at Risk and Biodiversity

Full paper

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G. TIPLEA, G. VLASCEANU, Z. MAROSY

Using of Magnetic and Homopolar Generator for Watering the Medicinal Plants Cultivation

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Eco-extraction of Albanian Chamomile Essential Oils by Liquid CO_2 at Different Temperatures and Characterisation by FTIR Spectroscopy

Full paper

R. BUZO, I. MALOLLARI, L. LICI, R. KONGOLI

Characterisation of Polyphenolic Changes during Wine Micro-oxygenation and Mathematical Modelling of Oxygen Distribution

Full paper

E. GEORGIEVA, P. PETROV, E. PAVLOVA

Monitoring of Nesting Avifauna and Habitat Types in the Protected Area ‘Sakar’

Full paper

M. C. RAISCHI, L. OPREA, DEÁK GYORGY, M. BOBOC, M. MATEI, N. RAISCHI

Investigation of Sturgeon Migration Routes Using the Most Adequate Monitoring Techniques in Difficult Hydrological Conditions of the Danube River

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D. G. CALINOIU, G. TRIF-TORDAI, I. IONEL

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I. VIZIREANU, R. MATEESCU, M. GOLUMBEANU, S. S. BENCIU, C. SLAVE

Environmental Applications of Object-based Classification Techniques in Time Series Analysis of Different Resolution Satellite Images

Full paper

D. I. TOPOR, S. CAPUSNEANU, A. S. TAMAS

Efficient Green Control (EGC) Encouraging Environmental Investment and Profitability

Full paper

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Environmental Objective Analysis, Ranking and Clustering of Hungarian Cities

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Aspects of Seismic Response of Vertical Breakwaters

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Place of Environmental History in Dıagnosis: Perspective of Medical School Students

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Full paper

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N. VELICKOVA

Environmental Impact of Heavy Metals on the Blood Cells in Professionally Exposed Workers

Full paper

E. V. IONESCU, C. OPREA, E. R. ALMASAN, L. E. STANCIU, M. G. ILIESCU

Biological Variation under Balneal Treatment of Serum Level of Leptin in Relation with Body Mass Index in Case of Patients Suffering from Knee Osteoarthritis

Full paper

S. RISTOVSKI, M. G. SOFRONIEVSKA, D. MLADENOVIC, M. SOSHOLCHEVA, M. KOCHUBOVSKI

Bladder Explosion during Bipolar Transurethral Resection of Prostate – Potential Hazard in Operating Theatre

Full paper

C. C. HEPCAN, S. HEPCAN

Assessing Avian Diversity of Urban Green Areas: the Case of Bornova, Izmir

Full paper

Environmental economics

O. R. IVAN, S. CAPUSNEANU, D. I. TOPOR, D.-M. OPREA (CONSTANTIN)

Auditing of Eco-dashboard of a Company in Aluminum Industry and Its Impact on Sustainability

Full paper

Information

Conclusions of the 52nd Croatian and 12thInternational Symposium on Agriculture, 12–17 February, 2017, Dubrovnik,Croatia

Errata

Journal of Environmental Protection and Ecology 18, No 1, 386–389 (2017)

Public health – environmental medicine

BLADDER EXPLOSION DURING BIPOLAR TRANSURETHRAL RESECTION OF PROSTATE – POTENTIAL HAZARD IN OPERATING THEATRE

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Abstract. Transurethral resection of the prostate (TURP) remains the gold standard for no laser option in treatment of benign prostatichyperplasia (BPH). Complications during the procedure are rare. An extremely rare complication is an explosion of the urinary bladder. This article reports a case where an explosionoccurred during bipolar TURP, resulting in a large intraperitoneal and extraperitoneal rupture of the urinarybladder. The patient underwent emergency laparotomy in order to repair the bladder.

Keywords: bladder, explosion, rupture, transurethral resection, prostate.

AIMS AND BACKGROUND

Transurethral resection of the prostate (TURP) is the most commonly used minimal invasive, no laser option in the treatment of benign prostatic hyperplasia (BPH) (Ref. 1). Expected complication rates after endoscopic BPH procedures as bladder mucosal injuryare about 0% (Ref. 2). Bladder rupture incidence during TURP is 0.01% as reviewed in the literature[1]. Release of flammable gases during the intervention can lead to explosion which can be manifested with minimal erosion, submucosal lesions or complete rupture of the bladder wall. Complete rupture of bladder wall needs surgical repair. We report large intra and extra peritoneal rupture of the bladder as a result of intravesical explosion during bipolar TURP (B-TURP). Review of literature and pathophysiological mechanism were described.

In order to avoid such hazards and protect patients, personnel and the environment, it is very important to assess the risk of such accidents[2].

* For correspondence.

CASE REPORT

A 78-year old patient underwent B-TURP as a treatment of benign prostate hyperplasia (BPH). The patient IPSS score was 32 points, prostate volume 105 ml, PSA-3.43 ng/ml, ASA scores 3. The B-TURP was carried out under spinal anesthesia. A 28 Ch. bipolar electro resectoscope with continuous irrigation (Olympus Winter & Ibe GmbH, Hamburg, Germany) was used during the procedure. An electrosurgical unit (BOWA ARC 350, BOWA-electronic GmbH & Co. KG, Gomaringen, Germany), was set in mode 2 with a cut power 200 W and coagulation power 100 W. At the end of resection loud explosion was heard with sharply descending of the lower abdominal wall. In that same moment the resection loop was glowing as shown in Fig. 1.

Fig. 1. Resection loop glowing during explosion

After 30 s, the patient complained of severe pain in the lower abdomen that quickly spread diffusely. Endoscopic exploration was impossible because of hemorrhage from ruptured wall. Emergency CT scan was performed with finding of intraperiteoneal contrast extravasations as shown in Fig. 2. Lower abdominal vertical incision was done immediately, with revision of the abdominal cavity and bladder. During the exploration, bladder rupture on sagital line was found. Part of it (12 cm) was intra peritoneal and 8 cm was extra peritoneal. Bladder wall was 12 mm thick and was sutured with Dexon 3-0 in two layers. Patients developed uncontrolled arterial hypertension and tachyarrhythmia and stayed five day in intensive care unit under mechanical ventilation. Fifteen days after recovery, cystography was made as shown in Fig. 3, and catheter was removed. After that, regular spontaneous voiding was established.

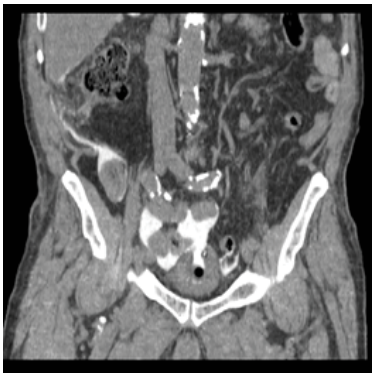

Fig. 2. CT intraoperative contrast extravasation after explosion

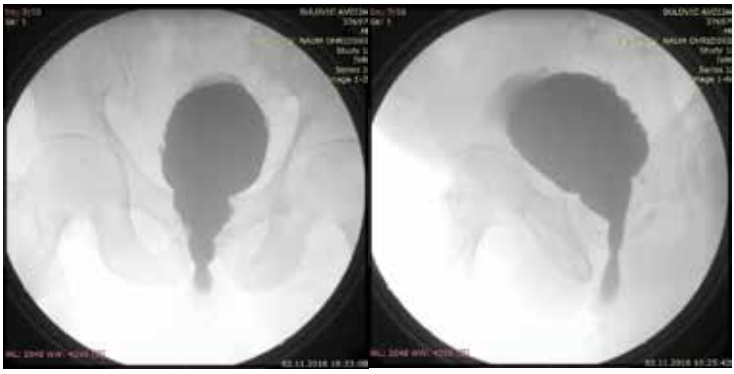

Fig. 3. Cystography before catheter removal (15 days postoperatively)

DISCUSSION

Explosion of bladder is severe and unexpected complication during TURP. The first case of bladder explosion during TURP was reported in 1926 by Cassuto[3]. In 1934 Kretschmer[4] reported two cases of bladder explosion with bladder rupture during TURP. Review of literature described only 26 cases of this blast type of bladder injury[4–8]. In the literature only one case of bipolar TURP (B-TURP) rupture is described[4]. During TURP, small bubbles are produced by electrolysis of intracellular water from prostate tissue. They contain 30–50% of hydrogen, 5–3% of oxygen and small percent of other gases derived from prostate tissue and water[6–8]. Concentration of oxygen is fourth time less than in air and is not enough to make explosion. Mixed with room 21% percent oxygen explosion is possible. In the presence of heated electrodes explosion can occur[5].

Blast injury often leads to subclinical ‘pop’ explosion sound. Larger blast energy leads to superficial tears damage of the mucosa and very rarely to complete rupture of the wall. Small extraperitoneal ruptures are treated only with catheteri-

sation but large extraperitoneal and all types of intaperitoneal ruptures mandatory need explorative laparotomy and suture of a bladder wall[6].

Takeshita described a simple technique for evacuating air bubbles with electro resectoscope from the bladder dome during transurethral resection to prevent large air bubbles. Several preventive measures have been suggested to avoid explosion. Some of them are: lower power electric current; preventing atmospheric air from entering into bladder with unnecessary use of evacuators; use of suprapubic pressure to evacuate bubbles of air from the bladder dome; positioning the patient in Trendelenburg or Fewler positions[6].

Some authors suggest and have done environmental health risk assessment studyes that can help in prediction and prevention of such working environment hazards[7]. Strategies to improve personal behaviour and practices at work should also be adopted to safeguard safety[8].

CONCLUSIONS

Transurethral resection of prostate remains a gold standard for the treatment of benign prostate enlargement because of its minimum risks for the intra and postoperative complications both for the patient and the surgeon. Even though it is labeled as safe procedure, sometimes it can be harmful and causes hazard in the operating theatre that needs strong precautions an urgent decision making if happens.

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