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Abdominal compartment syndrome after hip arthroscopy

Abdominales Kompartmentsyndrom nach Hüftarthroskopie

Die Hüftarthroskopie gilt als ein Verfahren mit geringen perioperativen Risiken. Während einer minimal-invasiven Resektion von periartikulären Verkalkungen an der linken Hüfte bei Zustand nach Endoprothese vor vielen Jahren kommt es bei einem 72-jährigen Mann zur Verschiebung von großen Mengen Spülflüssigkeit nach retroperitoneal und intraabdominal. In der Folge entwickelt sich ein akutes abdominales Kompartmentsyndrom mit Low-output-Kreislaufversagen. Symptomatik, notfallmäßige Diagnostik und zielgerichtete Therapie werden in dieser Kasuistik dargestellt. Der obstruktive Schock muss zeitnah erkannt und kausal behandelt werden. Die direkte, respektvoll kollegiale Kommunikation zwischen Anästhesist und Operateur ist Voraussetzung, um einen fatalen Verlauf für den Patienten zu verhindern.

Fragen? Für weitere Informationen zu dem hier berichteten Fall können Sie die Korrespondenzautorin auf Deutsch kontaktieren.

Case

A 72-year-old male (168 cm, 81 kg, American Society of Anesthesiologists, ASA risk class 2) was scheduled for an arthroscopic procedure of the left hip under general anesthesia. The procedure was indicated because of painful calcifications of the bursa iliopectinea (■ Fig. 1a, b) after a total hip replacement several years ago. After an uneventful induction of general anesthesia (endotracheal intubation, invasive arterial blood pressure measurement), the patient was placed in a right lateral position. No traction was applied to the limb.

The iliopectineal bursa was approached through an anterior portal and the optic was advanced into the area of the iliopectineal bursa. A second portal was established approximately 5 cm proximal to the first portal and the guide wire was introduced under visual control. This enabled good visualization of the iliopectineal bursa, psoas tendon and the anterior rim of the acetabular component of the hip replacement. Ringer's lactate was used as an irrigation fluid during the procedure. A pressure-controlled arthroscopic pump (Dyonics Intellijet Arthroscopic Fluid Management System V1.H; Smith & Nephew, Andover, MA, USA) with pressure set at 30 mm Hg was used. The ossification in the bursa was prepared and resected with a bur.

Despite deep muscle relaxation a continuous increase in the peak airway pressure was observed. Accordingly, the plateau pressure of the ventilator increased from a baseline value of 18 mbar up to 32 mbar 45 min after start of the operation (T₄₅). At T₃₀ progressive hemodynamic instability developed with reduction of arterial pressure from 126/78 mm Hg to 85/60 mm Hg and a sharp decrease in pulse pressure amplitude (■ Fig. 1c). A pulsus paradoxus-like pattern was observed. Hemodynamics could temporarily be stabilized by additional intravenous volume bolus of 2 × 500 ml warmed Ringerfundine and intermittent application of vasopressors (ephedrine and norepinephrine). At T₆₀ the hemodynamic situation deteriorated further and dramatically despite continuous vasopressor (norepinephrine) and fluid therapy. Therefore, the surgeon was informed to finish the procedure as soon

as possible. Beside the respiratory and hemodynamic alterations, a rapid drop of the esophageal temperature (starting at T₃₀) from 36°C to 34.6°C was observed. Prompt diagnostic work-up of the impending circulatory collapse was started. A transesophageal echocardiography immediately performed by a senior staff anesthesiologist revealed an empty left ventricle with a normal pump function and a collapsed right atrium. A pericardial tamponade was excluded. The patient was turned to the supine position. Using sonography a pneumothorax was also excluded and correct position of the endotracheal tube was confirmed by auscultation and bronchoscopy. After removing the drapes, a hard ballooned abdomen was found. The table was tilted to the left and the hemodynamic situation showed some improvement, probably because of partial relief of the inferior vena cava compression by the presumed high pressure in the abdomen. An abdominal sonography found a substantial amount of free fluid in the abdomen. A decision to perform a paracentesis was made and immediately more than 3 l of clear fluid were collected. A definitive drainage was installed and the patient was transferred to the intensive care unit. After drainage of more than 8 l of additional clear fluid collected with the paracentesis over a few hours the patient was rewarmed and finally extubated. He was discharged home 2 days later in good conditions. A follow-up telephone call after 3 weeks documented an uneventful recovery.

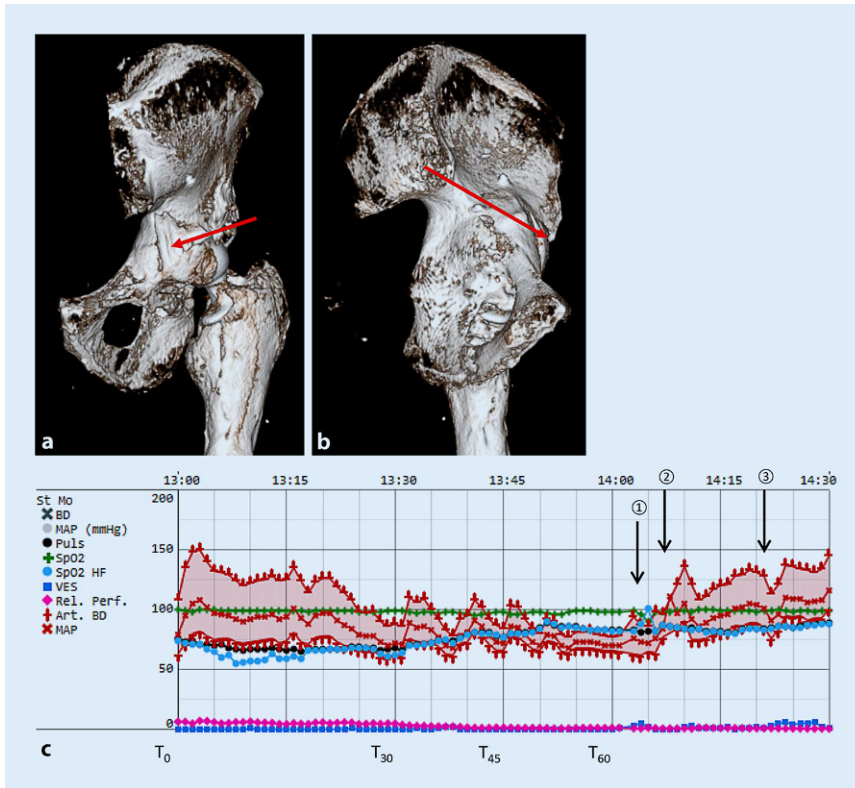


Fig. 1 ▲ a, b Reconstruction of the preoperative computed tomography scan of the left hip, anterior-posterior and lateral view. Calcifications of the bursa iliopectinea marked by arrows. c Excerpt of the hemodynamic parameters of the electronic anesthesia protocol. T₀ to T₆₀ surgery (in min). Arrow 1 supine position and transesophageal echocardiography, arrow 2 left tilt, arrow 3 abdominal sonography and paracentesis. BD blood pressure, MAP mean arterial pressure, SpO₂ percutaneous oxygen saturation, HF heart rate, VES ventricular extrasystole, Art. BD invasive arterial blood pressure

Discussion

A properly performed hip arthroscopy is considered a low-risk procedure [3, 7, 8] and overall, complications of hip arthroscopy seem to be rare [3, 4]. The most common complications are neurapraxia [6], portal wound bleeding, portal hematoma [2], trochanteric bursitis, septic arthritis and instrument breakage. In two systematic reviews, the cited complication rates varied between 0.41% and 0.45% for major complications and from 4.1% to 7.9% for minor ones. The most observed minor complications were osteochondral or temporary neural damage [5, 10]. Extra-articular fluid extravasation was the most frequent major complication. Retroabdominal and intra-abdominal fluid transfer during hip arthroscopy have been previously described [1] and seems to be more frequent in female patients and after long operating times [4]. It is a rare

complication in the presence of an intact joint capsule [7]; however, it can be a devastating complication if the barrier to the retroperitoneal space is interrupted [1]. In our case the hip arthroscopy was extracapsular beneath the psoas muscle. The procedure therefore was prone for retroperitoneal fluid transfer. The transfer of the irrigating fluid along the psoas compartment and to the retroperitoneum was possible although the pressure of irrigating fluid was carefully regulated and a lower pressure level was chosen than usual. The rapid accumulation of intra-abdominal fluid compromised venous return and caused severe obstructive shock. The deterioration of the hemodynamic situation could have been interpreted as tension pneumothorax (most common cause of obstructive shock) or pericardial tamponade. Only the understanding of the procedure, its potential complications and good communication with the

surgeon revealed the pathophysiological cause of a severely compromised venous return, almost unresponsive to fluid boluses and vasopressors. The surgeon's agreement to abort the procedure immediately was fundamental to save the patient's life. The drop of the patient's core temperature is also a noteworthy sign that should raise the suspicion of unwanted heat extraction by the irrigation fluid transferred into the retroperitoneum and the abdomen or even the thorax [9].

Conclusion

A hemodynamically relevant compression of the vena cava inferior due to fluid transfer should be taken into account during a hip arthroscopic procedure, especially when the capsule system of the hip is not intact or an extracapsular procedure is performed. Surgeons and anesthetists should communicate openly whenever unexpected findings occur especially in cases of instable vital signs. Thereby appropriate measures have to be taken to avoid a fatal outcome and the procedure should be aborted as quickly as possible.

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Compliance with ethical guidelines

Conflict of interest. A. Schwenter, G. Schuepfer, M. Beck and J. Mauch declare that they have no competing interests.

Ethical standards. For this article no studies with human participants or animals were performed by any of the authors. Written informed consent was obtained from the patient.

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3. Düsseldorfer „Triple ED Day“ am 11.09.2021

Regelmäßige Fortbildungen sind wichtig, gerade wenn es um Notfallmedizin geht. Der Düsseldorfer „Triple ED Day“ gibt uns die Möglichkeit, eine klinikübergreifende Fortbildung rund um Notfallmedizin und Zentrale Notaufnahmen virtuell zu begehen. Ziel ist es, aktuelles notfallmedizinisches Wissen mit besonderem Fokus auf die Zentrale Notaufnahme praxisorientiert zu vermitteln.

Neben einem Update zur Versorgung einzelner Krankheitsbilder wollen wir dabei insbesondere der aktuellen Entwicklung interdisziplinärer Zentraler Notaufnahmen Rechnung tragen. Da in der Notfallmedizin PatientInnen nicht mit einer Diagnose, sondern mit einem Symptom vorstellig werden, verfolgen wir in unserer Fortbildung einen leitensymptom- und fallorientierten Ansatz.

Da Notfallmedizin nur im Team funktionieren kann, laden wir neben den in den Zentralen Notaufnahmen tätigen pflegerischen und ärztlichen Mitarbeitenden auch Kolleginnen und Kollegen aller klinischen Partner und die Mitarbeitenden des Rettungs- und Notarztdienstes ein. Notfallmedizinisch interessierte Studierende sind ebenfalls herzlich willkommen. Durch die Chatfunktion des Online-Formates ergibt sich Gelegenheit für Fragen und spannende Diskussionen der Vorträge. Wir würden uns sehr freuen, Sie bei unserer interprofessionellen und interdisziplinären Veranstaltung online begrüßen zu dürfen!

Wissenschaftliche Leitung:

Prof. Dr. Michael Bernhard, Düsseldorf
Alexander Kleophas, Düsseldorf
Martin Pin, Düsseldorf

Organisation:

Universitätsklinikum Düsseldorf
Zentrale Notaufnahme
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Teilnahme:

Der Düsseldorfer Triple ED Day wird über die bekannte Fortbildungsplattform NOW TO GO übertragen.
Teilnehmen kann jeder, der sich kostenlos unter www.nowtogo.de registriert hat.

Die Veranstaltung ist kostenfrei. Die Anerkennung der Fortbildungsveranstaltung wurde bei der Ärztekammer Berlin und bei der Registrierung berufl ich Pfleger der beantragt.