

## ASSOCIATION BETWEEN HIGH D-DIMER PLASMA LEVELS AND HAEMATOMA – CASE REPORT

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### Summary

The presence of haematoma in patients after surgery is associated with increased plasmatic fibrinolytic activity. D-dimer is a specific marker of coagulation activation and fibrinolysis and, therefore, an indirect marker of thrombotic activity. The present case report was designed based on a significant increase in circulating D-dimer levels that were found in a patient with postoperative haematoma (after prosthetic umbilical hernia repair). The postoperative observation of D-dimer values showed a correlation between D-dimer level decrease and objective haematoma regression with ultrasonography.

KEYWORDS: *d-dimer, haematoma, hernia*

### POVEZANOST POVIŠENE RAZINE D-DIMERA I HEMATOMA- PRIKAZ SLUČAJA

#### Sažetak

U operiranih bolesnika postojanje hematoma je povezano s povećanom fibrinolitičkom aktivnošću. D-dimer je specifični marker koagulacijske aktivnosti i fibrinolize te zbog toga i indirektni marker trombotičke aktivnosti.

U ovom radu je prikazano signifikantno povećanje koncentracije D-dimera u bolesnice s postoperativnim hematomom (nakon operacije umbilikalne hernije). Postoperativno praćenje vrijednosti D-dimera je pokazalo povezanost između smanjenja koncentracije D-dimera i regresije hematoma što je praćeno ultrazvukom.

KLJUČNE RIJEČI: *d-dimer, hematom, hernija*

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### INTRODUCTION

D-dimer is a specific marker of coagulation activation and fibrinolysis and, therefore, an indirect marker of thrombotic activity. This specific cross-linked fibrin degradation product is formed through the sequential action thrombin, activated factor XIII and plasmin (1-3).

D-dimer is cleared through the kidneys and the reticuloendothelial system and has a plasma

half-life of approximately 8 hours (4). Low levels of D-dimer can be found circulating under normal physiologic conditions, while pathologically elevated levels can be found in any condition associated with enhanced fibrin formation and fibrinolysis (1-3). D-dimer level is elevated in clinical conditions such as disseminated intravascular coagulation, trauma, surgery, burns, infection, haematoma, arterial thrombosis, general hospitalization, pregnancy and the puerperium, cancer,

myocardial infarction, stroke, connective tissue disorders, inflammatory bowel disease, diabetes, thrombolytic therapy, older age.

Umbilical hernias in adults are considered acquired hernias. Conditions that result in increased intra-abdominal pressure, such as pregnancy, ascites or acute abdominal distention, can develop umbilical hernia. Using mesh for hernia repair is a very common procedure. The most common complications of mesh repair are seroma, haematoma or abscess formation.

The present case report was designed based on a significant increase in circulating D-dimer levels that were found in a patient with postoperative haematoma (after prosthetic umbilical hernia repair). The postoperative observation of D-dimer values showed a correlation between D-dimer level decrease and objective haematoma regression with ultrasonography. The D-dimer concentration in this case report was expressed in  $\mu\text{g/L}$  with normal range between 170-550  $\mu\text{g/L}$ .

## CASE REPORT

A 36-year old female inpatient was admitted to our hospital for treatment of umbilical hernia. The clinical finding was preoperatively confirmed by ultrasound examination. The patient's hernia was acquired 6 years before, during her first pregnancy. Over the last year the patient noticed occasional pain in the umbilical area. She had a history of abdominal surgery with two cesarean sections. Other than that, the patient did not have any significant medical history. The surgery for umbilical hernia repair was carried out under general anaesthesia. Polypropylene mesh (Proceed) was used in the onlay position. On the day of surgery, treatment with low molecular weight heparin was initiated with a 5.000 IU dose s.c., and repeated postoperatively for another two days, during the patients' hospital stay. Immediately after surgery the patient was complaining about occasional pain under the right costal margin. On the 10<sup>th</sup> postoperative day the patient complains about having belching episodes at the beginning of a meal, with slow appearance of a haematoma in the area of the incision. On the 13<sup>th</sup> postoperative day the haematoma was spontaneously drained. On the following day the haematoma was evacuated by a large gage syringe puncture. Ultrasound examination

showed extensive haematoma above and below the mesh. Treatment with amoxicillin with clavulanic acid was initiated. Two days later, inflammatory parameters were normal, but D-dimer levels were 2816  $\mu\text{g/L}$ . Haematoma was evacuated every two days.

Follow up ultrasound monitoring of the haematoma (Figure 1) with D-dimer levels were taken on the 21<sup>st</sup>, 39<sup>th</sup>, 67<sup>th</sup>, 91<sup>st</sup> and 116<sup>th</sup> postoperative days, showing a correlation between D-di-

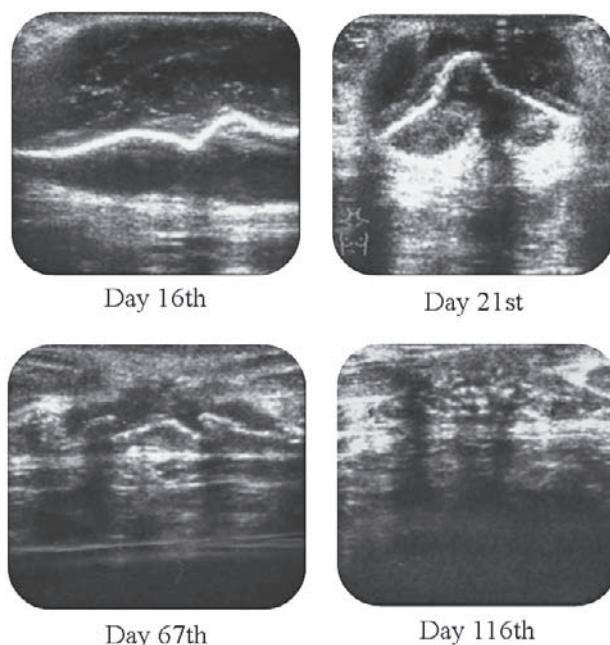


Figure 1. Haematoma regression monitored with ultrasound.

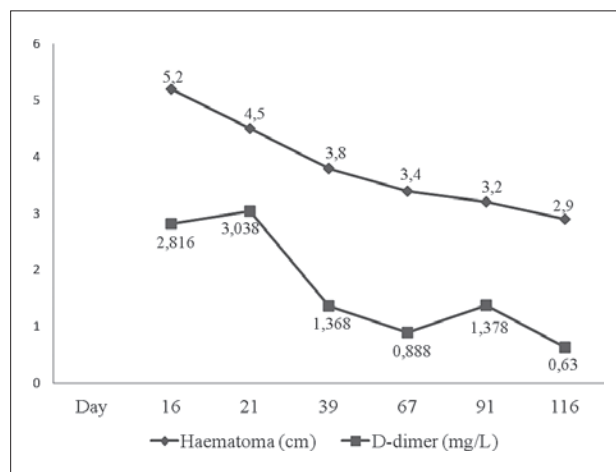


Figure 2. Postoperative D-dimer levels in correlation with haematoma size ( $r=0,912$ ,  $p=0,011$ ,  $95\%CI=0,387-0,99$ ).

mer level decrease and objective haematoma regression (Figure 2).

On the 21<sup>th</sup> postoperative day, D-dimer levels were 3038 µg/L. 18 days later, haematoma regression was monitored with ultrasound, with D-dimer levels dropping to 1368 µg/L. On the 67<sup>th</sup> postoperative day, further haematoma regression was noticed, with D-dimer levels 888 µg/L. Three months postoperative, D-dimer levels were 1378 µg/L, with ultrasound findings showing now a seroma in organization. One month after that, being now 4 months postoperative, D-dimer levels dropped to 630 µg/L.

## DISCUSSION

D-dimer, the degradation product of fibrin, is well-established as a useful biomarker for exclusion of venous thromboembolism and the diagnosis and monitoring of disseminated intravascular coagulation. D-dimer is widely used as a diagnostic tool in low- and moderate-risk patients with suspected pulmonary embolism or deep venous thrombosis. In patients with low to moderate pre-test probability, a negative D-dimer result can prevent unnecessary exposure to radiation and contrast and decrease the length of stay in the emergency department, reducing the patient's financial burden (5).

As shown in this case study, D-dimers may be elevated after surgery. The first study on kinetics of D-dimer after general surgery was made by Dindo et al. in 2009. allowing an estimation at which point in time D-dimers reach normal values in asymptomatic patients after surgery. The study revealed that D-dimer levels after minor surgery do not increase. However, opening the peritoneum leads to an increase of D-dimer levels depending on the duration of surgery and invasiveness of the operation. It demonstrated that D-dimer levels are elevated for up to 6 weeks after major abdominal surgery in an average surgical population (6).

Furthermore, the level of D-dimer may be predictive of prognosis in cancer patients. A very high D-dimer level may be an indicator of longer hospital stay and in those with malignancy, it may also be an indicator of poor prognosis. The cohort analysis of 1178 cancer patients by Ay and colleagues supports this hypothesis (7). Elevated plasma values of D-dimer are frequently found in

patients with liver cirrhosis with a higher incidence in decompensated disease (8). The underlying pathogenesis is still unclear and controversy still exists whether it is a primary phenomenon or induced secondary to coagulation activation and delayed hepatic clearance (9,10).

Rodelo et al. suggest in their study that high levels of DD are associated with 28-day mortality in patients with infection or sepsis identified in the emergency department (11).

A study by Young-Woo Park et al. shows that D-dimer level significantly increases after the onset of an acute ischemic stroke and that the D-dimer level correlates positively with acute ischemic volume. D-dimer can be considered as a valuable marker for predicting infarction volume in acute ischemic strokes and treatment response (12).

Weather d-dimer levels would stay elevated for a longer period if complications occurred after surgery, as shown in this case report, stays unclear. This case could be stimulus for further research on the kinetics of D-dimer in patients with postoperative complications after general surgery.

## CONCLUSION

As shown in this case report, D-dimer levels can be elevated in patients with haematoma. With regression of the haematoma, D-dimer levels of the patient parallelly decreased. With this case report, a correlation between D-dimer levels and haematoma size monitored with ultrasound, could be established.

In conclusion, this assay could have the potential of being useful in a variety of other clinical settings. However, clinicians need to be able to accordingly evaluate and link the laboratory test results with the patient's medical history when making any clinical decisions.

Indicating postoperative complications such as haematoma formation, it might be useful to do further research about the advantages of including D-dimer results into pre- and post-operative medical assessments.

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