Potential savings for fasciotens®Abdomen in perioperative use in patients with open abdomen treatment

1. **Length of stay Intensive Care Unit (ICU)**

Patients who require treatment with an open abdomen are usually critically ill and require intensive care. In addition, due to pulmonary involvement (e.g. polytrauma or sepsis), the majority are ventilated for at least the first few days of treatment. Until the abdominal cavity is finally closed, the care of these patients is very complex and in the vast majority of hospitals only possible in an intensive care unit. The length of stay in the ICU therefore plays a significant role. Unfortunately, there is no published, up-to-date data from Czech Republic on the costs of an ICU bed per day. The most recent figures for Germany can be found in a study by Kaier et al. from 2020, which analysed data from 2013. The average daily cost of an ICU bed for a ventilated patient is €1590 [1]. Although, the Czech and German health care system is not exactly comparable regarding cost, the numbers are still roughly transferable as the cost have risen the past 12 years also in Czech Republic. The cost for a ventilated patient in ICU in Czech Republic is therefore assumed to be equal to approx. **39,600 CZK** (conversion rate 1 € = 24.9 CZK).

The decisive factor in open abdomen treatment is definitive closure at the end of treatment, as otherwise the risk of complications increases significantly [2]. In order to achieve this treatment goal, continuous traction on the abdominal wall is required during treatment to prevent the lateral abdominal wall muscles from moving apart. The most widely used procedure at present is mesh-mediated fascial traction (MMFT). There is a systematic review (SR) on this by Petersson et al. [3]. The majority of studies do not specify the length of stay in the ICU. However, it can be assumed that patients are in the intensive care unit from the time the abdominal cavity is opened and left open until closure, most of them being ventilated. Therefore, the days until closure are assumed to be the length of stay. Petersson et al. thus calculated a mean length of stay of **14.9** days across all included studies [3].

Fasciotens®Abdomen is an innovative surgical medical device and is the only procedure that enables perioperative, continuous, adjustable and vertical traction in open abdominal treatment. To date, there have been three case series with a total of 38 patients included [4–6]. Across all studies, the average time to closure and therefore length of stay in the ICU was **9.9 days**.

In the following, both methods are compared for the costs in the ICU of 39,600 CZK/day

MMFT: 14.9 days x 39,600 CZK/day = 590,040 CZK per patient

Fasciotens®Abdomen 9.9 days x 39,600 CZK/day = 329,040 CZK per patient

Savings potential through the use of fasciotens®Abdomen = **261,000 CZK per patient**

Of course, the product costs of fasciotens®Abdomen are not included in the above calculations. The costs per device and patient (disposable product) amount to 137,500 CZK. If these costs are deducted from the differential amounts mentioned above, the result is still a positive amount of **€ 123,500 CZK per patient.**

1. **Reduction in revision surgeries**

Another decisive factor is the number of revision operations required before definitive abdominal wall closure. In principle, several factors must be considered, in particular the indication for an open abdomen, the infection situation in the abdominal cavity and the swelling of the abdominal organs. Nevertheless, the figures for mesh-mediated fascial traction and fasciotens®Abdomen can also be compared here. In the SR by Petersson et al., the average number of revision surgeries for all studies analysed was **4.5** surgeries/patient [3]**.** In the studies by Fung et al. and Dohmen et al. with a total of 29 patients included, an average number of revision surgeries of **3.5 surgeries/patient** was reported [5, 6]. On average, **one** revision operation can therefore be saved. Unfortunately, the duration of such a revision operation can only be estimated, but based on the experience of users, it can be assumed to take at least 60 minutes. The cost of an operating theatre minute is fundamentally difficult to calculate, as there are various influencing factors (material, personnel costs, type of procedure). In Czech Republic, there are no relevant data available. A recent literature search from the USA on a total of 51 studies revealed an average cost of $46.04 per operating theatre minute [7]. This corresponds to approx. **1,077 CZK/OR minute** at the exchange rate at the time (1 USD = 23,4 CZK on average in 2022). Naturally, healthcare systems can only be compared to a limited extent. However, if we look at expenditure on the healthcare system measured as a proportion of gross domestic product (GDP), Czech Republic spends 9,5 % of its GDP on health care compared to 16.6% in the US, which makes it still comparable [8].

If the costs of 1,077 CZK per operating theatre minute are now allocated to the saved operating theatre time of approx. 60 minutes, this results in a further potential saving of **64,620 CZK per patient**. In addition, this does not take into account the fact that transporting ventilated patients to and from the operating theatre requires additional resources and is cost intensive.

1. **Summary**

Fasciotens®Abdomen is used perioperatively in the treatment of open abdomens. The patient population consists of critically ill patients who generally require intensive care and ventilation. Patients require intensive medical care at least for the time that the abdomen remains open during treatment. Based on the cost of a ventilator bed per day and the average length of stay of patients, the use of fasciotens®Abdomen results in a cost reduction of **123,500 CZK per patient** compared to the most widely used procedure (device costs already included). On average, one revision operation up to abdominal wall closure can also be saved, resulting in additional savings of **64,620 CZK** assuming an operating time of 60 minutes. From the payer's perspective, the use of fasciotens®Abdomen results in a potential saving of approx. **188,000 CZK per patient**, **including device costs**.

Additionally, the operating times freed up, usually more than 60 minutes per patient and application, can be used for other, smaller procedures so that the existing operating capacities can be optimised. The capacity for patients requiring intensive care is also increased.

**Sources**

1. Kaier K, Heister T, Wolff J, Wolkewitz M (2020) Mechanical ventilation and the daily cost of ICU care. BMC Health Serv Res 20:267. https://doi.org/10.1186/s12913-020-05133-5

2. Granger S, Fallon J, Hopkins J, Pullyblank A (2020) An open and closed case: timing of closure following laparostomy. annals 102:519–524. https://doi.org/10.1308/rcsann.2020.0105

3. Petersson P, Petersson U (2020) Dynamic Fascial Closure With Vacuum-Assisted Wound Closure and Mesh-Mediated Fascial Traction (VAWCM) Treatment of the Open Abdomen—An Updated Systematic Review. Front Surg 7:577104. https://doi.org/10.3389/fsurg.2020.577104

4. Mones T, Chobanova V, Department for Vascular Surgery, St. Vinzenz-Hospital, Cologne, Germany, et al (2024) Vertical Mesh-Mediated Fascial Traction and Negative Pressure Wound Therapy: A Case Series of Nine Patients in General and Vascular Surgery. Surg Technol Int 44:. https://doi.org/10.52198/24.STI.44.HR1781

5. Fung S, Ashmawy H, Krieglstein C, et al (2022) Vertical traction device prevents abdominal wall retraction and facilitates early primary fascial closure of septic and non-septic open abdomen. Langenbecks Arch Surg. https://doi.org/10.1007/s00423-021-02424-1

6. Dohmen J, Weissinger D, Peter AST, et al (2024) Evaluating a novel vertical traction device for early closure in open abdomen management: a consecutive case series. Front Surg 11:1449702. https://doi.org/10.3389/fsurg.2024.1449702

7. Smith T, Evans J, Moriel K, et al (2022) Cost of OR Time is $46.04 per Minute. JOrthoBusiness 2:10–13. https://doi.org/10.55576/job.v2i4.23

8. OECD (2023) Health at a Glance 2023