ON TRAUMA SUSCEPTIBILITY IN GENERAL SURGERY

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ABSTRACT — The review highlights some issues about the effect of the surgical injury degree on the development of the stress response of the organism and the possibility of reducing the impact of these factors on the development of postoperative complications.

KEYWORDS — risk factors, surgical injury, assessment of the stress response, inflammation, blood loss.

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Surgical intervention occupies a special place in the formation of operational risks. Any operation, through the release of biologically active substances, leads to the strain of all body systems. The severity of these changes is proportional to the traumatic nature of a surgical intervention (1).

A surgical trauma is difficult to measure, and the processes caused by a surgical trauma are difficult to fix. H.H. Malinovsky and co-authors (1973), G.L. Ratner (1988) defined a surgical trauma as a combination of an intraoperative blood loss, duration of surgery and the size of a surgical wound.

In view of the complexity of the interpretation, the very concepts of a "high surgical trauma", "average", "small" differed significantly over time. An example of this is a total endoprosthesis operation of large joints. Some time ago, it was rated as an "surgery with a high degree of a surgical injury" (2). Today, the traumatic character of this surgery is assessed as average. Surgeries are performed much more often, the operative techniques have improved; surgeries have become practically "bloodless", and implants have changed. However, the degree of the tissue damage has not changed.

In view of the fact that a surgical injury is associated with the degree of the tissue damage, it is expected to be associated with blood loss, and, therefore, with a deficit of the circulating blood volume (CBV deficit) (3). However, being a risk factor in the preoperative analysis of the clinical situation, the CBV deficit is also difficult to predict because of the large number of "unaccounted" variables (experience and qualification of personnel, technical equipment of the operating theatre, etc.). Nevertheless, there is a generally accepted perception of the traumatic nature of surgery associated with an operative access, the risk of bleeding, the amount of "removed" tissue and the proximity of the surgeon's work to vital organs and systems.

The traumatic nature of a surgical intervention is the main factor determining the severity of the surgical stress response (4, 5) which is defined as the complex of general (nonspecific) and local (specific, depending on the zone of the surgery and its nature) pathophysiological reactions. The response is assessed not only by the level of blood plasma hormones, but also by the quantity and nature of analgesics necessary for an adequate analgesia in the postoperative period (6).

The bodily reaction to damage is stereotyped and plastic, and the forecast of its severity is difficult. Even for insignificant aggression, we can observe a wide range of response cascade processes. On the other hand, a significant, in our opinion, aggressive influence, is met with a rather restrained response. An example of the latter clinical situation can be surgical interventions for tumors of the laryngopharynx. The region with reflex-active organs has complex reflex interactions — conditions for realising an expressed stress response to damage. However, it is often possible to observe a minor pain syndrome with normal blood circulation, absence of manifestations of inflammatory reactions and assessment of pain by means of Verbal Rating Scale shows no more than 2–3 points.

Any trauma is accompanied by the development of a local inflammation. Restriction and elimination of damaged tissue is the basis of the recovery process, and the severity of the systemic inflammatory reaction directly depends on the traumatic nature of the surgical intervention (7).

The formation of insulin resistance, which is not only considered as one of the markers (8) of stress, but also as a factor increasing the risks of continued growth and metastasis of malignant neoplasms, relates to the characteristics of surgical stress (9), in addition to systemic inflammatory and immunological changes.

Strategies for reducing a surgical injury. Perhaps, endoscopic surgeries can be regarded as low-traumatic. When they are performed, the expected effects of limiting a surgical injury are achieved: the operative access time is reduced, there is less tissue damage, a good cosmetic effect, a reduced pain syndrome, a reduced hospital stay and patient disability, and their early labor and social rehabilitation (6). However, when these surgeries are performed, there are some risk factors. For example, with the application of the pneumoperitoneum and thoracoscopy, there are, not infrequently, large changes in the ventilation and circulation (10). We must not forget, as it is the case with many endoscopic interventions, the necessity of a long pathological intraoperative position of the body.

Conservative methods can limit the stress reaction of a body to a surgical trauma by controlling glycemia with insulin and a glucose-potassium mixture (reducing the severity of the systemic inflammatory reaction, the concentrations of pro-inflammatory cytokines, C-reactive protein, serum amyloid A), early initiation of enteral nutrition, β-adrenoceptor blocking agents (13), xanthine derivatives (inhibition of tumor necrosis factor synthesis) (14), glucocorticoids (limitation of the inflammatory reaction) (15).

Modern methods of general anesthesia, having their own potential of a surgical injury, have only a minimal stress-limiting effect which extends only to the intraoperative period (16), while changes in homeostasis persist for several days and even weeks after surgery (5).

CONCLUSION

Thus, the traumatic nature of the operation with the development of the stress response of the body is responsible for the development of postoperative complications. Having assessed these risks, it is necessary to determine the choice of the strategy of reduction, and, therefore, the prevention of complications.

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