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LETTER TO EDITOR

Chemistry for Surgeons

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Sir,

We read with great interest the article by Raj Kumar et al., regarding the principles of chemistry applicable in surgery [1]. Our body is a vast chemical processing plant and chemistry of body fluids, be it blood, urine, or even breath is a reliable indicator of health and well being. Debridement of a wound involves use of various chemical agents besides surgery. Choosing appropriate chemical agents for breaking down necrotic tissue is necessary to enhance wound healing. Therefore, understanding the chemical structure, nature, and mechanism of action of these agents is vital. Most commonly used agents are hydrogen peroxide (H_2O_2), hypochlorous acid, povidone iodine, etc. Collagenases are being used for debrima for a long time, H_2O_2 is believed to act by producing free radicals and nascent oxygen. Hypochlorous solution works on a similar principle.

An important concept that the authors could have included is the difference in properties of an acid and alkali corrosives and the fact that alkali is more dangerous than acid because acid produces coagulative necrosis forming a layer of coagulated proteins preventing further harm, while alkali causes liquefactive necrosis resulting in further penetration of chemical and causing more tissue damage. Associated pyloric spasm further adds to its deleterious effects.

A novel concept based on chemistry is mass spectroscopy (MS). MS-based tool sprays a microscopic stream of charged solvent onto a tissue surface to gather information about its molecular makeup, and produces a color-coded image that reveals location, nature, and concentration of tumor cells. It measures the differences in protein expression between tumor and normal adjacent tissue. This aids in understanding how changes at the transcriptional level translate to the protein level.

Before concluding, we would like to mention about chemical equilibrium that governs many of the chemical reactions occurring in our body, which regulate the concentration of various substances, notably pH, in the bloodstream.

$$H_2CO_3 - H_2O + CO_2$$

This is a reversible reaction and is important for maintaining pH within normal range. Underlying chemistry is crucial to be understood for correctly interpreting the results of ABG evaluation.

Also, we would like to point out certain issues in few of the examples discussed by the authors. The importance of urinary sodium has been highlighted in a patient with post-operative oliguria. However, there are various other conditions that can alter urinary sodium levels and should be kept in mind like hyperaldosteronism, diuretic therapy, SIADH, hypothyroidism, use of drugs like NSAIDS, certain corticosteroids, etc.

In the example of anastomotic leak resulting in dyselectrolytemia, the authors must have clarified if the inference is based on available literature. If not, there can be other causes of acute stress reaction in a post-operative patient resulting in similar blood picture.

In conclusion, we completely agree with the authors regarding the need for surgeons to consider and constantly evaluate the chemical equations that are occurring inside the patients.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

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