

Visual Comparative Colorimetry: A Practical Method of Estimating Operative Blood Loss

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Abstract

Most anesthesiologists estimate blood loss by rough visual assessment, by noting its effects on cardiovascular parameters, by weighing of swabs, by subtraction of fluids used in surgical irrigation from blood in suction reservoir, either by laboratory estimation or by trusting their experience and instinct. I describe here a simple and practical method of estimating operative blood loss (OBL). It is based on colour comparison of two solutions containing blood using simple equipments readily available in any operating room, without the need to know the patients' initial Hb or Hct or depend on laboratory results.

Using visual comparative colorimetry (VCC) in a clinical setting is simple. We collect five ml of patient's blood in a heparinized syringe and use it to prepare a standard 1% solution in water (sample A) (as our pilot study revealed that the optimum concentration of hemoglobin in samples to be compared appears to be about 0.15 gms% i.e. 1% solution). In a large container, a homogenous solution of lost blood is prepared by washing all the soaked swabs. Blood collected in the suction bottle is added to the solution. Sufficient amount of water is then added, so that the final colour of the solution resembles the prepared standard.

Now, 10 ml of this solution is taken by a 10 ml syringe in a test tube. Another test tube is filled with 9 ml plain water. Blood from the original patient sample, suitably diluted to 10% (according to the pilot study) is now loaded in an insulin syringe and added drop by drop into the second test tube (sample B). Both solutions are visually compared against an x-ray view box for colour match. Once a colour match is obtained, the amount of blood required to obtain this result (Vb) is noted.

OBL is then calculated in ml by using a simple mathematical formula:

$$OBL = Vb / Vc \times Vd$$

Where Vb is the volume of blood added to obtain a colour match, Vc is the volume of the sample (10 ml in this case) and Vd is the total volume of the prepared homogenous solution (diluent).

Similar samples were sent to the laboratory by a blinded investigator for colour comparison using a spectrophotometer for the naked eye to obtain a colour match.

Results revealed that dilute solution 1-2% gave accurate results; the range of error was much higher in readings by spectrophotometer than in our method, the mean error was 2.3%.

By using VCC, it is much easier to make an informed decision regarding blood transfusion and avoid unnecessary single unit transfusions. However, the accuracy of the method depends on meticulous preparation of solutions and accurate titrations. Of course, the need to observe universal precautions for handling bio-hazardous material cannot be over-emphasized.

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