

Appendix A

Method for assessment the initial head CT (The ABCDE Method)

Knowing that many primary injury patterns need to be accurately assessed in the initial CT, the consensus group proposed the use of a previous defined local organized method for assessment, based on the ABCDE acronyms.

A). Abnormal Findings:

In this step we identify in general the most important findings in the cranial CT as bleeding, midline shift and/or occlusion of the basal cisterns in order to target the most critical injuries that compromise the patient's life. (The step requires only the identification, not specific measurements or classifications).

Possibilities: Normal or Abnormal

A: Asymmetry and abnormalities: Draw a midline in the CT. Verify symmetry and presence of lesions comparatively between left and right sides (Figure 1).

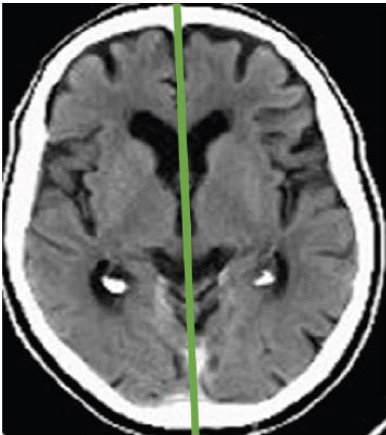


Figure 1. Comparing left and right sides of the imaging searching fro asymmetries or abnormalities.

B). Blood Volumes

After identifying a hemorrhage or bleeding in **A**, the second step is to measure the volume:

Indications for measuring volume (Intracerebral Hemorrhage or Epidural Hematoma): ABC Method

Identify the level of CT with the largest area in diameter of bleeding (Slice 1). Measure the largest diameter (wide) within the hematoma (A) in centimeters. Measure the greater diameter at 90° (high) in the same

slice (B) in centimeters; C will be measured counting and comparing each additional slice with bleeding above the Turkish Sella, taking the slice where A & B were measured as a 100% of bleeding. If the volume of bleeding in the new slice is greater than 75% of the volume, compared with the initial slice, we assign a value of 1. If the volume of bleeding in the slice is between 25% and 75%, we assign a value of 0.5 and if the volume is less than 25%, we do not assign any value. (Figure 2)

Formula: Volume = (AxBxC)/2).

Critical values for surgical indication: Epidural 30cc, Intracerebral 50cc

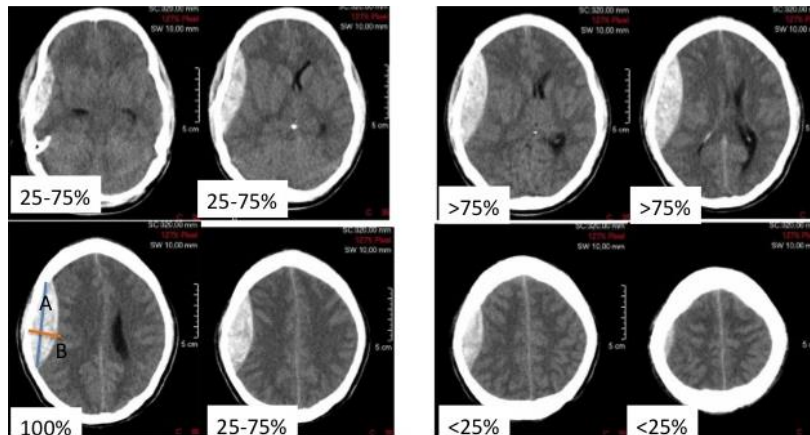


Figure 2

Measurement of ICH and Epidural volumes:

1. Identify the CT slide with the largest area of hemorrhage and then identify:
2. Greater diameter within the hematoma (Line A)
3. Diameter at 90 ° of line A in the same slide (Line B).
4. Count and compare each additional slide above the sellar region where is present blood with the slide were A and B lines were established.

If the volume of bleeding is greater than 75% of the bleeding size of the slide were A & B were measured, assign a value of 1 to each slide that meets this characteristic. If it is between 25% and 75% assign a value of 0.5 and if the volume is less than 25% do not assign any value. Then we can calculate the total CC of volume with this formula: $Volume = (A * B * C) / 2$. C will be the final score of points assigned in step 4. Remember that values over 30cc in epidurals or 50cc in ICH require immediate surgery (Figure 3).

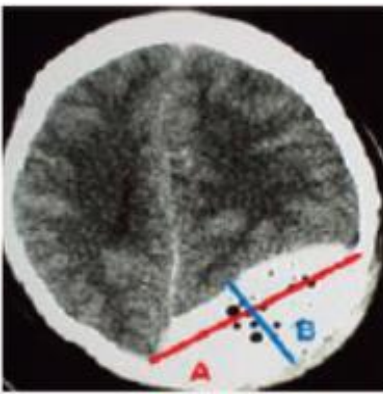


Figure 3. A and B lines are established in the slide where the bleeding volume is bigger compared with the other slides. Measurement will be performed in centimeters.

Indications for measuring volume (Subdural hematoma): Measure the thickness of the clot with the software or the scale of the image from the bone edge to the inner edge of the clot. Critical values for surgical indication are clots greater than 1cm. (Figure 4)

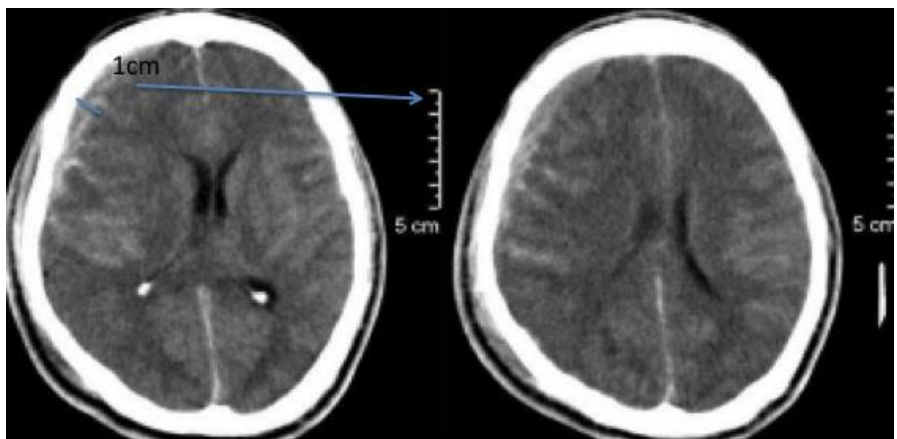


Figure 4

Measurement of subdural hematoma:

Measure the thickness of the clot using the software or the image scale; draw a line from the bone border to the inner edge of the clot. In this case, the blue B line will be the width of the blood clot. Remember that widths more than 1cm in subdural hematomas required immediate surgery (Figure 5).



Figure 5. A and B lines are established in the slide where the bleeding volume is bigger compared with the other slides. Measurement will be performed in centimeters.

C). Cisterns Compression

After identifying basal cisterns compression, we can proceed to classify the degree of occlusion:

Indications for measuring obliteration of basal cisterns: Locate the slice where the perimesencephalic cisterns are seen. Observe the corresponding hypodensity of the cisterns around the mesencephalon (Bilateral side: Ambient and Crural and rear side: cuadrigeminal). Open (all cisterns hipodense lines are present) (1st Degree edema) partially closed (one or two hipodense lines are not present) (2nd Degree edema). Fully closed (all hipodense lines are not present) (3rd Degree edema). Degrees 2 and 3 are critical for surgical indication.

C: Cisterns compression: Look for the slide where the peri-mesencephalic cisterns are observed. Appreciate the 3 hypo dense lines corresponding to the CSF around the cisterns: 2 lateral CSF spaces (right and left) at the Ambient and Crural cisterns, and 1 posterior: corresponding to the Cuadrigeminal cistern (Figure 6). Then classify the obliteration in the next scheme:

- Grade 1: All cisterns are present (hypo dense lines around the brain stem)
- Grade 2: Partially closed, one or two cisterns are obliterated
- Grade 3: Completely closed, all cisterns are obliterated



Figure 6. Basal cisterns (CSF spaces) obliteration can be correlated with the degree of brain tissue edema. 3 main cisterns need to be visualized, 2 lateral and 1 posterior.

D). Deviation from Midline

Measurement of width of intracranial space at bi-temporal level (A Line) in millimeters. After that a B distance is measured in millimeters from the bone edge to the septum pellucidum (right in the middle of the frontal horns) at the deviation side. The midline deviation can be determined by calculating: **MLD= (A/2) – B**

D: Deviation of midline: Check the slide where you can identify the frontal horns of the lateral ventricles, then draw a midline and measure the deviation as follows:

Line A: Bitemporal intracranial space measurement crossing at the level of monro foramina. Measure in centimeters.

Line B: Immediately inferior to A line, you can draw a second line from the inner table of the temporal bone to the septum pellucidum on the deviated side, this is called Line B and its measured also in centimeters.

The deviation of the midline can be calculated with the following formula: $MLD=(A / 2)-B$ (Figure 7).

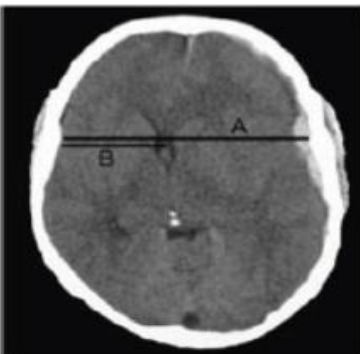


Figure 7. Midline shift measurement. It can be calculated with the formula: $(A/2) - B$.

E). External Elements

In this step we identify other adjacent injuries in soft tissues as bruising or swelling on the scalp, skull fractures (depressed or open), injuries in the cerebellum, ventricles or maxillofacial injuries are identified.

E: External elements: Describe abnormal findings, including fractures, metal fragments or other foreign objects; also describe infarction areas or cerebral edema around the blood collections.