Objectives: The Ellipsoid Volume Estimation (EVE) has been proposed as a predictor of blood loss and postoperative complications during resection of Carotid Body Tumors (CBT); however, not all CBT have ellipsoidal shape. The aim of this study was to compare this method with three-dimensional (3D) volumetric reconstruction and its association with intraoperative bleeding.

Methods: Retrospective analysis was conducted in patients with history of CBT resection and preoperative CTA imaging from 2006 to 2017. The studied parameters were: the volume of the ellipse, distance from the tumor to the base of the skull (DTBS), tumor shape and borders, and volumetric analysis performed by 3D reconstruction of DICOM images with the software Osirix® (Figure). Values of 3D volumetric analysis were compared with those of the EVE using paired Student t-test; association between estimated blood loss (EBL), volumetric analyses, DTBS and Shamblin type were determined using Pearson correlation.

Results: Fifty-seven patients were included (mean age of 59 years, 90% women). Based on Shamblin classification, 23% were type I, 37% were type II and 40% were type III. EBL was 559 milliliters (mL), SE 80, the mean procedural time was 202 minutes (SD 67). Shamblin I tumors, were correlated with an ellipsoid shape and with regular borders in 70% of the cases, whereas the Shamblin type II and III tumors had irregular borders as well as showing irregular shapes in the majority of these tumors. The mean tumor volume with 3D reconstruction was significantly larger with a mean of 19. 9 cm³ compared to the 15. 8 cm³ determined with the ellipsoid formula (p<0. 0001). This difference was more accentuated in CBT Shamblin III (30. 6 cm³ and 23. 9 cm³) (Table I). The 3-D volumetric analysis had a higher association with EBL (r² = 0. 37) compared to ellipsoid formula (r² = 0. 33), DTBS (r² = 0. 27) or Shamblin classification (r² = 0. 16).

Conclusions: The 3-D Volumetric analysis had a higher association to estimate blood loss compared to the ellipsoid formula. The EVE might be inaccurate in non-ellipsoidal tumors, the variability of tumors shapes, particularly the type III might explain these findings.