Purpose:
To determine the ion recombination correction factor using different methods in medium dose per pulse electron beams for Advance Markus ionization chamber (AMC)

Methods:
Two different methods were applied to obtain ion recombination correction factor. Conventional Boag€™s two voltage analysis (TVA) recommended in IAEA TRS-398 dosimetry protocol and recently modified Boag€™s TVA expressions which consider the effect of free electron contribution on ks value. High energy electron beams of a dedicated linear accelerator, NOCAC7 (NRT, Italy), for intraoperative radiation therapy were applied. Dose per pulse in medium range of 4 to 41 mGy/pulse was investigated. Radiochromic films (ISP Gafchromic EBT2, USA) have been exploited as reference dose rate independent method. Dose measurement was performed by AMC in a small water phantom (IBA Dosimetry, Germany).

Results:
At reference conditions (9 MeV, 100 mm applicator, SSD 80 cm (27 mGy/pulse)), ks values derived from IAEA TRS-398 dosimetry protocols deviates 0.3% from reference value. From 4-35 mGy/pulse TVA yielded acceptable result (in average 1.0% deviation). For dose rate more than 35 mGy/pulse, conventional two voltage analysis (TVA) might be applied with caution (4.2% deviation at 41 mGy/pulse). In this range first model in the new modified Boag€™s expressions yielded acceptable accordance (average deviation 1.3%) in comparison with dose rate independent reference dosimeter (EBT2, Gafchromic film). The deviation in ks value among Boag€™s modified expressions increased when the dose rate raised.

Conclusions:
Authors concluded that AMC could be employed for absorbed dose determination of medium dose per pulse electron beams. The accuracy of TVA which is recommended currently in dosimetry protocol IAEA-TRS-398 is dependent on the range of applied dose rate. It is proper to be used for dose rate less than 35 mGy/pulse. First expression in Boag€™s modified formulas is proper for ks determination in high dose rate values (> 35 mGy/pulse).