Introduction
Treatment of brain arteriovenous malformations (bAVMs) aims to change the natural history of the disease by eliminating the risk of bleeding or re-bleeding. Multimodality approach to bAVMs is frequently the preferred strategy for management of these lesions. Preoperative embolization techniques are frequently used to facilitate microneurosurgical resection. Advantages include reduction of volume and blood flow of AVM, minimization of operative time and blood loss, elimination of deep sited feeders, and prevention of risk of injury to eloquent structures. Preoperative embolization, however, may cause a various range of morbidity and mortality. Complication rate is correlated with number of treatment sessions and embolized pedicles.

Methods
Between January 2007 and December 2012, 29 patients with bAVMs were treated by single staged combined endovascular and microneurosurgical technique by Neurosurgery and Interventional Neuroradiology teams at the Istanbul University, Cerrahpasa Faculty of Medicine. Series included 14 female and 15 males with the mean age of 34 (18-51). Among them, 11 patients presented with hemorrhage (38%). Based on Spetzler Martin (SM) grade, there were 2 grade IV, 12 grade III, 13 grade II and 2 grade 1 AVMs.

Results
14 patients were treated by embolization followed by surgery. In 11 patients AVMs were completely occluded by embolization. 3 patients underwent surgical resection after attempted embolization. In one case, embolization was performed after partial surgical resection. Mortality occurred in one patient (3%) with ruptured SM grade IV AVM. Rebleeding and massive brain edema occurred after surgical resection of partially embolized lesion. Permanent visual field deficit was documented in 2 patients with occipital AVMs (7%). Transient neurological deficits included dysphasia in one and motor deficits in another three patients.

Conclusions
Based on our preliminary results, single staged combined endovascular and microneurosurgical treatment of bAVMs can reduce the early and late risks of preoperative embolization. Careful patient selection based on angiographic and anatomical characteristics of lesion, age, medical condition, and neurological status of patient is important. Team work and collaboration together with personal and institutional experience is mandatory. Finally, treatment of these rare lesions should be centralized in high volume centers with dedicated team.

References

Learning Objectives
By the conclusion of this session, participants should be able to:
1) Describe the importance of multimodality treatment of brain AVMs, 2) Discuss the benefits and risks of combined embolization and surgical treatment of bAVMs