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Impact of elective temporary clipping on intraoperativerupture on neurological outcome after surgery for ruptured anterior circulation aneurysms—A prospective multivariate study

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Methods ETC was utilized with low-force temporary clips under normothermic, normotensive conditions. The postoperative protocol included Phenytoin, Nimodipine, and volume expansion.Induced hypertension was employed during symptomatic vasospasm. Occurrence of intraoperative rupture , details of temporary clipping timing, number of attempts, and the post-op adverse events were entered in prospective database and were followed up until discharge or death. Glasgow outcome scale (GOS), assessed at 3 months either directly or over telephone. Patients whose outcome could not be ascertained at 3 months were excluded from all analyses. Univariate and multivariate analyses were performed using SPSS20.

Introduction Intraoperative aneurysmal rupture (IAR), can occur during: predissection, dissection of aneurysm, and aneurysm clipping [1]. Since Jefferson's first use in 1928 [2], there has been number of studies on the use of elective temporary clipping (ETC) to decrease the risk of IAR[3]. Different authors have endeavored to establish safe time periods for temporary clipping, as clinical ischemic deficit or radiological evidence of stroke [3-5]. The period of stroke-free temporary clipping, however, varies considerably, depending on clinical factors, method of neuroprotection, and which vessel is occluded [6, 7].

Results
Of the total 273 ruptured aneurysm surgeries studied, IAR was observed in only six out of 132 aneurysms (4.5 %) who had ETC, compared with 78 out of 141 (55.3 %) without ETC ($p<0.001$). Aneurysms complicated by IAR had significantly longer clipping time (8.3 min) compared with those without IAR (1.9 min) ($p<0.001$). IAR had significant association with unfavorable outcome (38 % vs. 24 %) (p00.02). Patients with ETC had significantly shorter clipping time (2.9 min) compared with those without ETC (4.8 min) (p00.02). Unfavorable outcome was noted in 30 out of 132 with ETC (23 %), compared with 48 out of 141 without ETC (34 %) (p00.04). This beneficial effect was nonsignificantly greater in younger and good clinical grade patients. While episodes of ETC within clipping time of 20 min did not show significant difference in outcome, repeated rescue clipping (45 % unfavorable outcome, p00.048) and total clipping time of at least 20 min (75 % unfavorable outcome, p00.008) had significant impact on outcome. In multivariate analysis, the use of ETC (p00.027) and total temporary clipping less than 20 min (p00.049) were noted to result in significantly better outcome, independent of other factors.

Conclusions ETC decreased IAR and the total clipping time, thereby leading to significantly better outcome.

Learning Objectives
The use of elective temporary clipping decreased the occurrence of Intra operative aneurysm rupture and the total clipping time, thereby leading to significantly better outcome

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