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SURGICAL OUTCOMES OF SUBMACULAR HAEMORRHAGE TREATED WITH PARS PLANA VITRECTOMY AND SUBRETINAL INJECTION OF TISSUE PLASMINOGEN ACTIVATOR

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Purpose. To evaluate surgical outcomes of submacular haemorrhage (SMH) over a 10-year period.

Methods. This was a single-centre retrospective study conducted at the vitreoretinal department of the Royal Hallamshire Hospital, Sheffield, United Kingdom. Clinical records of patients presenting with acute SMH of any aetiology between 2015 and 2025 were reviewed. Inclusion criteria were: SMH involving the fovea, treatment with pars plana vitrectomy (PPV) and subretinal injection of tissue plasminogen activator (tPA), and a minimum follow-up of 2 months. Primary outcomes included change in visual acuity (VA), displacement of SMH, reduction in central retinal thickness (CRT), and surgical complications.

Results. Eighty eyes of 79 patients met the inclusion criteria with mean age of 82 years. Median time from symptom onset to surgery was 7 days. Aetiology of SMH were choroidal neovascular membrane (CNV) secondary to wet age-related macular degeneration (AMD, n=65), ruptured retinal arterial macroaneurysm (RAM, n=12), valsalva retinopathy (n=1), myopic CNV (n=1), and idiopathic (n=1). The median follow-up duration was 2 months. Submacular haemorrhages were categorised into three groups for analysis: small - confined to the macular region within the vascular arcades (n=48); large - extending beyond the arcades (n=24); and massive - extending beyond the equator (n=8). A 25-gauge PPV was performed in 85% of cases, and gas tamponade was used in 98%. No intraoperative complications were documented. Displacement of blood away from the fovea was achieved in 89% (n=71/80) of cases, with only 9 eyes showing persistent subfoveal haemorrhage. Mean CRT significantly reduced from of 914 μm (95% CI 839–988) at presentation to 422 μm (95% CI 373–472) postoperatively ($p < 0.001$). Median baseline VA was 1.8 logMAR, improving to 1.3 logMAR postoperatively (median gain of -0.44 logMAR; $p < 0.001$, 95% CI 0.0–0.5). Subjective visual improvement was reported by 63% of patients. Multivariable linear regression identified wet AMD as the only factor associated with poorer visual improvement although not statistically significant (0.43 logMAR less gain; $p = 0.055$, 95% CI -0.87 to -0.009). A multivariate logistic regression model (AUC 0.83) demonstrated that each additional day of surgical delay reduced the odds of achieving VA of 1.0 logMAR or better by 13% (coefficient -0.135, $p = 0.01$). Larger haemorrhage size (large or massive) also negatively impacted the likelihood of attaining this vision level ($p = 0.024$). Subgroup analysis of patients with RAM-related haemorrhage showed significantly greater visual improvement compared to those with AMD-related haemorrhage (median gain -0.80 vs -0.22 logMAR respectively; $p = 0.007$). Significant postoperative complications included re-bleeding (n=9), full-thickness macular hole (n=3), and rhegmatogenous retinal detachment (n=3).

Conclusions. PPV with subretinal tPA is effective for displacing SMH, reducing macular thickness and improving vision. Visual outcomes are better in smaller SMH, earlier surgical intervention.