

## Reply: Intra-arterial chemotherapy for retinoblastoma: 2-year results from tertiary eye-care center in India

We thank authors for the interest in our report and expanding the scope of discussion.<sup>[1,2]</sup>

In our series, Intra-arterial Chemotherapy (IAC) was carried out in all patients by placing the microcatheter close to the origin of the ophthalmic artery where the predominant flow of chemotherapeutic agent was guided into the ophthalmic artery and controlled by intermittent fluoroscopic screening and manual hand injection. The manual injection was pulsatile with the adequate pressure of injection maintained so that the medicine enters the ophthalmic artery without causing any spasm or dissection. These techniques help us prevent arterial dissection/thrombosis/severe vasospasm. Here follows a point-by-point rebuttal.

In one of the cases, the ostium of ophthalmic artery was extremely narrow with collateral supply from an external carotid artery, through the middle meningeal artery. The latter was super-selectively catheterized, and IAC carried out. In all other cases, catheterization of the ophthalmic artery was possible. Hence, our rates of ophthalmic artery catheterization are consistent with the reported rates of successful catheterization in >98% of cases in the first attempt.<sup>[3,4]</sup> In 2 cases, the internal carotid artery (ICA) showed a looping in its course where the mother catheter was kept proximal to the loop fearing the risk of spasm. In another 2 cases, there was an acute angle of the origin of ophthalmic artery from ICA. Hence, care was taken that the microcatheter

was stationed proximal to ostium by either manipulating the microcatheter gently or by placing the mother catheter more inside the ICA. We rarely use a reverse V tipped microcatheter. We have used Echelon 45° angle microcatheter in 1 case. As a general rule, we use straight tip microcatheter in almost all cases of IAC, as they are least traumatic and don't cause spasm, which is very common with angled tip microcatheters for their inherent shape. Angled microcatheters are also mainly used for aneurysm coiling procedures, so the tip is not as soft as the straight tip microcatheter.

Although not the primary objective of the study/procedure, the visual acuity was documented in all our cases, using age-appropriate and acceptable methods [Table 1]. We did not

**Table 1: Visual outcomes for patients undergoing intra-arterial chemotherapy: 2 years follow-up**

Age at diagnosis (months)	Baseline visual acuity	Final visual acuity
32	Fixates and follows	Not applicable
8	Fixates and follows	Not applicable
13	Fixates	Fixates and follows
36	CSM	6/30 (Snellen)
24	Fixates and follows	6/9.5 at 3m (Iea symbols)
16	CSM	Fixates and follows
48	6/7.5 (Iea symbols)	6/30 (unaided, Iea symbols)
11	Fixates and follows	Fixates
20	No fixates	CSM
28	CSM	6/15 (Iea symbols)

CSM: Central, steady, and maintained

encounter any case of foveal/choroidal atrophy in our series, as expected with melphalan (5/7.5 mg) and topotecan (1 mg). Although one case developed STBRVO and arteriolar attenuation, the fovea was spared.

As has been established, primary IAC is ideal for unilateral sporadic retinoblastoma (RB). Most of the cases in our series had bilateral RB with advanced disease; that is the nature of our referral practice. We used IAC as a secondary salvage therapy in most of these eyes notwithstanding reports of "tandem" treatment for bilateral RB with primary IAC.<sup>[3,4]</sup> We believe intravenous chemotherapy (IVC) provides adequate systemic cover for germline tumors (all bilateral cases), reducing the risk of second primary malignancies later in life. Secondary IAC has shown good results in eyes resistant to IVC and facing enucleation as the only option. This becomes especially relevant in bilateral cases with one eye already enucleated.

We agree with the authors, due to small sample size, a comparison of primary vs secondary IAC outcomes was not statistically feasible. We continue to follow these cases for a longer duration while also recruiting newer cases for management with IAC and hope to report a more detailed analysis of various parameters in the long-term in future. As reported in our previous report, we believe this technique should be limited to select, experienced centers until the full value and limits of this approach are realized. We continue to use this technique with caution.<sup>[5]</sup>

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#### Conflicts to interest

There are no conflicts of interest.

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