*G Chir Vol. 39 - n. 4 - pp. 227-231*
*July-August 2018*

original article

# Peribulbar anesthesia in sclero-retinal surgery: two quadrants vs single injection

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SUMMARY: **Peribulbar anesthesia in sclero-retinal surgery: two quadrants vs single injection**

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Purpose. *To evaluate the advantage of peribulbar anesthesia in two quadrants (infero-temporal and upper nasal) vs single injection technique (infero-temporal) for scleral rhegmatogenous retinal detachment surgery (RRD).*

Patients and methods. *57 patients, aged between 33 and 75 years (57.01 ± 8.68), waiting for retinal detachment surgery, were randomized in two groups: a group S (29 patients), with single quadrant injection technique and a group C (28 patients) with two quadrants injection. Patients in Group S were injected in two quadrants with a 10 ml mixture containing Mepivacaine 2% 5 ml and Ropivacaine 0.75% 5 ml, with hyaluronidase 10 IU/ ml. Patients in group C were injected with the same anesthetic mixture in one quadrant. Number of additional injection, during surgery, in two groups, were reported. Pain was tested with VAS (Verbal Analogue Scale 0-10) after regional block, when muscles were insulated, during scleral buckling positioning, when conjunctive was closed and 6, 12, 24 hours after surgery.*

Results. *The need for a second peribulbar injection of anesthetic occurred in 9 patients of group C (32.14%); further injection was necessary in 1 patient (3.57%) of group S during scleral buckling (VAS = 7), statistically significant (p <0.05). Postoperative VAS 6 – 12 – 24 hours after surgery was not significant.*

Conclusions. *The peribulbar anesthesia may be proposed in scleral surgery of retinal detachment; the injection in two quadrants secured solid and satisfactory anesthesia, increasing the outcome of retinal surgery in loco-regional anesthesia.*

KEY WORDS: Acute rhegmatogenous retinal detachment - Scleral surgery - Peribulbar anesthesia.

## Introduction

The rhegmatogenous retinal detachment (RRD), occurs when the sensory retina splits from the retinal pigment epithelium with accumulation of fluid from the vitreous cavity in the subretinal space through one or more break points (1).

Its pathogenesis depends on the action of dynamic vitreoretinal traction which is often manifested in the presence of a predisposing retinal degeneration. It occurs with a frequency of 9-24/100,000 people each year, between 40 and 80 years (2, 3).

Surgery closes the retinal breaks with reapplication of the detached retina to the underlying retinal pigment epithelium, by scleral (ab-exterior) and pars-plana vitrectomy (ab inside) approach.

Scleral surgery through indentation (buckling) of retinal breaking, obtains retinal repair and decrease the vitreoretinal traction (4). The retinopexy with criotherapy and cerclage complete the surgery.

Retinal adhesion, by pars plana vitrectomy, air or heavy liquid level exchange in the vitreous chamber, combined with internal drainage of subretinal fluid, is obtained.

Retinopexy with endo-laser and internal tamponade of retinal breaks, during the absorbable gas or silicone oil filling, can be proposed (5).

Some time ago, both surgical procedures in general anesthesia were performed; regional anesthesia

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was used when absolute contraindications to general anesthesia were present. Since the 90s, anesthesic blocks for vitreoretinal surgery increased, because of faster post-operative outcome, the ability to avoid dangerous complications of general anesthesia (nausea and vomiting) and lower health care costs (1, 4, 6).

Retrobulbar and peribulbar anesthesia, together with sub-tenon infiltration are indicated in retinal surgery (7, 8). The retrobulbar injection can determine complications, because of the frequent association of retinal detachment with myopia, that increase the risk for possible bulbar puncture (9, 14).

Peribulbar anesthesia can represent an alternative to retrobulbar (15, 19); the anesthetic's solution is injected in extra conal space, after topical anesthesia, with an inferior-temporal access, less vascularized and easier approach. Unfortunately, anesthesia can be incomplete because of the limited anesthetic's diffusion to eye's structures. The need to repeat intraoperatively the peribulbar injection, is a possibility (20, 21); rhegmatogenous retinal detachment, particularily in vitreous surgery, less painful than scleral surgery, can be indicated for peribulbar anesthesia (22). British Association of Ireland and Vitreo-retinal Surgeons (BEAVRS) showed that only 22.8% preferred loco-regional anesthesia for retinal and vitreous surgery, with significant variations depending on the patology: 33.6% for macular hole surgery, 23.3% for vitrectomy and 21.4% for scleral surgery (23). Several studies (24, 25) evaluated the eye's pain after anesthesic block for vitreoretinal surgery, without specifying the surgical technique (pars plana vs. scleral surgery) (26-30). Nicholson et al., already in 1992, concluded that peribulbar anesthesia should be considered the first choice in vitreous surgery, second grade in scleral surgery. In another study, 26 of 33 patients (78.8%) obtained adequate anesthesia and akinesia for vitrectomy, 9 of 32 patients (28.1%) for scleral surgery (28). Purpose of the study was to evaluate peribulbar anesthesia for scleral surgery in patients with rhegmatogenous retinal detachment; a standardized volume of anesthetic in two quadrants vs single quadrant injection were used.

## Patients and methods

57 patients (28 women and 29 men) aged between 33 and 75 years (57.01 ± 8.68 years) from ophthalmic emergency room, with a diagnosis of rhegmatogenous retinal detachment, were considered.

After informed consent for surgery in loco-regional anesthesia was obtained, patients were randomly assigned to two groups: group S, with peribulbar anesthesia through inferior-temporal and upper nasal quadrant injections of anesthetic solution (Mepivacaine 2% 5 ml and ropivacaine 7.5 mg/ml 5 ml), with hyaluronidase 10 IU/ml and group C, with infero-temporal quadrant single injection of similar anesthetic solution. BD Microlance™ 3 - 25G (0,5 x 16 mm) in both groups were used; Honan balloon, between 20-30 mm mercury for 10 minutes, after the injection was positioned, to lower intraocular pressure and optimize the anesthetic's diffusion. When balloon was removed motor block was tested, based on the ability to move the eyeball in the four quadrants, upwards, downwards, right side and left side. The eye's movement was classified as: absent (0), present (1). Patient's pain with Verbal Analogue Scale (VAS 0 no pain – 10 intolerable pain) was valued to: T0, with conjunctive four quadrants pinching before surgery; T1, with rectus muscles by wire traction, after conjunctival dissection; T2, when scleral encircling and buckling was realized; T3 when conjunctival accesses were closed (Figure 1).

VAS was repeated postoperatively, 6, 12 and 24 hours after surgery.

Peribulbar injection was repeated, based on the group they belong to, for patients with VAS > 3; paracetamol 1g i.v. postoperatively was administered. Intraoperative and postoperative pain, the need to peribulbar anesthesia and rescue doses of paracetamol were reported.

Intra and postoperative nausea and vomiting, if present, were signaled. The day after surgery, peripheral nerves injury were monitored, asking the patients about the presence of dysesthesia around the eye, or extraocular muscular weakness. Data with Fisher's exact test (FET) were statistically evaluated. A multivariate logistic regression was used to avoid influences of other factors (age, sex, ethnicity).

## Results

The average duration of surgery was 101±11.42 minutes in group S and 96±11.68 in group C (Table

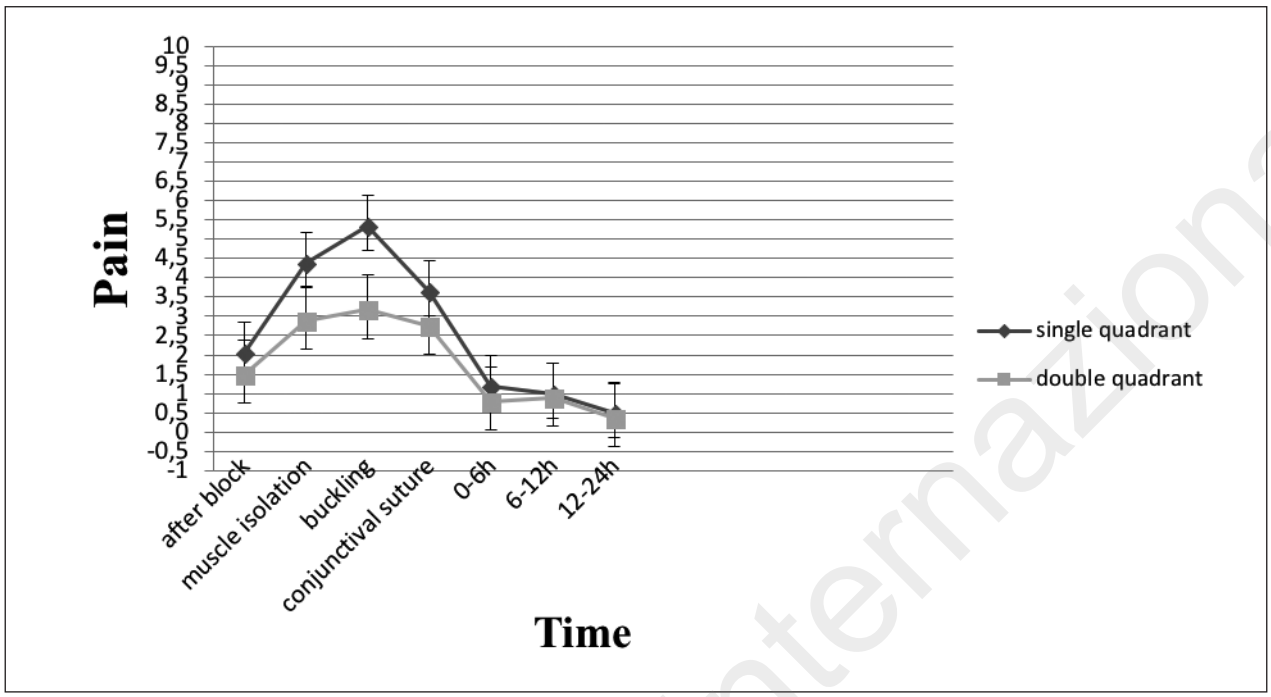


**Figure 1 - VAS Average Pain after single and two quadrants injection.**

TABLE 1 - CASE STUDIES.

| | **Single quadrant anesthesia (infero-temporal)(n=28)** | **Two quadrants anesthesia (infero-temporal, nasal - above) (n=29)** |
|---|---|---|
| **Age** | 57,14 ± 9,92 | 56,89 ± 7,48 |
| **Female** | 15 | 13 |
| **Male** | 13 | 16 |
| **Time of surgery** | 154,64 ± 30,26 | 150,24 ± 34,12 |

1). After peribulbar block, complete akinesia in 100% patients of S group was obtained, incomplete in 3 patients (10.71%) of C group, with persisting upward and medially movement.

The need for a second peribulbar injection in 9 patients of C group (32.14%) was evidenced, after 132±23.59 minutes the peribulbar block was done. Intolerable pain (VAS>5) in 6 patients (66.6%), during scleral buckling and 3 patients (33.4%) during pulling muscles was reported.

One patient (3.57%) in group S requested a further injection of local anesthetic, because of the pain reported (VAS=7) at the scleral buckling. The comparison of these data was statistically significant ($p < 0.05$).

Further peribulbar injection was repeated during repeated muscular tractions and sclera manipulation.

No significant pain (VAS<3) in group S was evidenced during the preoperative Honan ballon oculopression in the individual quadrants and intraoperatively (Figure 2).

Twenty-three patients (79.31%) of S group and 25 patients (89.29%) of C group, during conjunctive closure reported poor pain (1<VAS<3). Postoperative VAS 6, 12 and 24 hours after surgery, were not significant (Figure 2).

Paracetamol 1g i.v. was administered orally, when pain was present. No patient reported nerves injury and or sensitive dysestesia; intra and post-operative nausea and vomiting were absent.

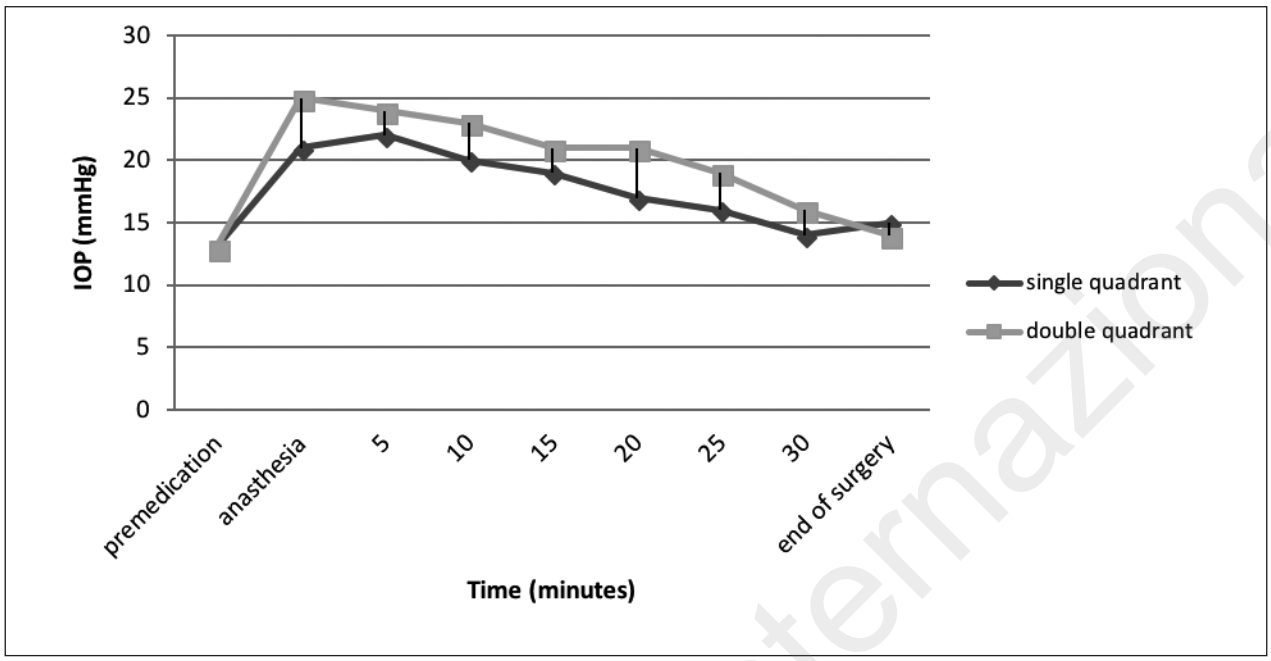


**Figure 2 - Average Intra Ocular Pressure (IOP) by Tono-pen system.**

## Discussion

Scientific literature doesn't report clinical data about two quadrants peribulbar anesthesia for scleral rhegmatogenous retinal detachment surgery.

Gill VS et al. (2012) (29) recently confirmed the greater effectiveness and safety of anesthetic solution 10 ml into two quadrants, compared to a single injection, in vitreous surgery for retinal detachment with sub-tenon injection. Peribulbar anesthesia was never examined with single and two quadrants infiltration.

Our study evidenced higher advantages, in terms of akinesia and analgesia, of two quadrants peribulbar anesthesia for scleral retinal detachment surgery, vs single injection with the same 10 ml anesthetic mixture (mepivacaine 2% 5ml more ropivacaine 7.5 mg/ml and hyaluronidase 10I.U./ml).

Better akinesia of two quadrants peribulbar block in group S was referred after ocular pression with Honan balloon (no movement compared with detectable movements in 10.71% of group C patients); further intraoperative injection of anesthetic in 1 patient and lower intensity of intra and post-operative pain in C patient's group ($p<0.05$) were reported.

Probable uniformly anesthetic solution diffusion after two quadrants peribulbar injection evidenced a significant quality advantage.

Major complications lacking (eye's perforation, lesions of the optic nerve, orbital hematoma, persistent eye's motor deficits), confirmed the safety of two quadrant's peribulbar block, even though double injection was necessary.

In conclusion, the study validates peribulbar anesthesia for scleral surgery, like the vitreous surgery; two quadrants peribulbar anesthesia secures intraoperative analgesia and akinesia, comparable to retrobulbar block, with a reduced risk of ocular complications.

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