

Dear Doctor,

Greetings from Micro Labs Limited. We are happy to bring you '**Ophthalmal Focus**' which contains latest and interesting news in the field of Ophthalmology.

This issue contains

- Assessing the trends in presentation of Graves' orbitopathy to the European Group On Graves' Orbitopathy (EUGOGO) tertiary referral centres and initial management over time.
- Determine the Phacoemulsification Grooving Efficiency in Longitudinal vs Transversal Handpiece.
- Automated grading system of retinal arterio-venous crossing patterns: A deep learning
- A Rare Case Report on Bilateral Congenital Retinal Macro Vessel

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Looking forward to your valuable feedback

Best Regards,

Medical Team, Micro Labs Limited

Assessing the trends in presentation of Graves' orbitopathy to the European Group On Graves' Orbitopathy (EUGOGO) tertiary referral centres and initial management over time

INTRODUCTION:

Graves' orbitopathy (GO), also called thyroid eye disease, is the common extra thyroidal manifestation of Graves' disease, although less frequently, it may also occur in association with chronic autoimmune thyroiditis¹. Graves' disease predominantly affects women typically in their third to fifth decade has an overall prevalence of 0.5%. Around 15% of patients with Graves' disease who do not have Graves orbitopathy at baseline will develop it, typically within 3–6 months on average². Onset of GO commonly concurs with onset of autoimmune thyroid disease, but subclinical eye disease may sometimes be present before the clinical syndrome becomes evident. While most cases of GO are associated with hyperthyroidism, a minority of patients (about 10%) may be hypothyroid or euthyroid³. It shows adverse impact on quality of life and possess a significant public health burden, in terms of direct and indirect costs⁴.

METHODS:

A Prospective observational multicentre study was conducted in all new referrals with diagnosis of GO within September–December 2019. Clinical and demographic characteristics, referral timelines and initial therapeutic decisions were recorded. Data were compared with a similar EUGOGO survey performed in 2012. Patients were assessed using the EUGOGO case record form (CRF), which includes demographic data and a detailed ophthalmological and endocrine assessment. According to established EUGOGO protocols ophthalmic signs were assessed. a well-defined protocol for the clinical assessment of GO using a photographic atlas was adopted by the EUGOGO group.

RESULTS:

A total of 432 CRFs were included from 16 participating EUGOGO centres. Study results show that at presentation to an EUGOGO centre, the duration of eye symptoms and thyroid symptoms in general was similar in 2019 and 2012. Compared with the 2012 cohort, patients were significantly older in the 2019 cohort as ophthalmic symptoms were similar in the two cohort, whereas initial management plans were similar in 2012 and 2019. However, there was less indication for eyelid surgery in 2019 (2.4% vs 13.9%) when compared to the 2012.

The distribution of severity changed from 2012 to 2019, reduction of mild and severe cases was found but an increase of moderate cases was seen.

There were fewer indications of steroid treatment (26.6% vs 35.1%; p 0.040), even in active cases (57.1% vs 74.1%) and fewer indications for surgical decompression (8.9% vs 16.1%) in 2019 vs 2012 in Old Centres (OC)

Table:1 Therapeutic decisions of patients referred in EUGOGO centres, comparison between 2019 and 2012 study

Variable	2019	2012
Watchful monitoring	66	49
Local measures	58.7	59.9
Steroids	25.8	30.3
Orbital irradiation	5.5	7.9
Surgical decompression	12.4	16.5
Lid surgery	2.4	13.9
Menopause	No	14.00
Eye muscle surgery	5.7	5.2

CONCLUSION:

The study found that compared with 2012 in 2019, there was an increase in participating EUGOGO centres and increase in the total number of patients included in the study and positive developments of GO in Europe could be linked to EUGOGO's mission, which includes educational commitments

REFERENCE:

1. Schuh A, Ayvaz G, Baldeschi L, Baretic M, Bechtold D, Boschi A, Brix TH, Burlacu MC, Ciric J, Covelli D, Currò N. Presentation of Graves' orbitopathy within European Group On Graves' Orbitopathy (EUGOGO) centres from 2012 to 2019 (PREGO III). British Journal of Ophthalmology. 2023 Jan 10.
2. Taylor PN, Zhang L, Lee RW, Muller I, Ezra DG, Dayan CM, Kahaly GJ, Ludgate M. New insights into the pathogenesis and nonsurgical management of Graves orbitopathy. Nature Reviews Endocrinology. 2020 Feb;16(2):104-16.
3. Genere N, Stan MN. Current and emerging treatment strategies for Graves' orbitopathy. Drugs. 2019 Feb;79(2):109-24.
4. Bartalena L, Kahaly GJ, Baldeschi L, Dayan CM, Eckstein A, Marcocci C, Marino M, Vaidya B, Wiersinga WM. The 2021 European Group on Graves' orbitopathy (EUGOGO) clinical practice guidelines for the medical management of Graves' orbitopathy. European journal of endocrinology. 2021 Oct 1;185(4):G43-67..

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Determine the Phacoemulsification Grooving Efficiency in Longitudinal vs Transversal Handpieces

INTRODUCTION:

Worldwide, Cataracts are a common, correctable cause of vision loss. Modern cataract removal surgery is performed by the removal of the cataracts lens by phacoemulsification, replacement with an artificial lens¹. A new artificial, intraocular lens (IOL) replaces the opacified crystalline lens in order to restore vision and focusing power. During the grooving step, various settings can be adjusted to allow for an optimal and efficient surgery². Phacoemulsification also uses surgeon guided automated irrigation and aspiration system to aspirate the cortex and nuclear fragments³. For successful completion of a cataract surgery, selection of optimal settings to balance fluidics and ultrasound (US) power, appropriate phaco tip size, and design are vital⁴. The factors like Bottle height, vacuum, aspiration flow rate, power, and hand piece type (longitudinal vs transversal) are all variables that can be adjusted to improve phaco efficiency¹. The aim of this study is to measure grooving times at various power settings, in order to determine optimal power settings. It also compares longitudinal vs transversal hand pieces.

METHODS:

Cataractous lenses were simulated by exposing porcine lenses to formalin for 2 hours. A total of 120 lenses were analysed at various power settings on both longitudinal and transversal hand pieces. Twenty trials each were performed with power set to 25%, 50%, and 75% on both hand pieces. To provide longitudinal power, Whitestar Phaco Handpiece System was used, and a Whitestar Signature Ellipsis Handpiece to provided transversal power. The other investigator recorded times and adjusted settings. The Whitestar Signature Pro phaco system was used for grooving. ANOVA from the Data Analysis plug-in for Microsoft Excel was used to compare the average, mean, variance, and groups

RESULTS:

Study results show that average grooving time for the longitudinal setting was 4.972 ± 0.84 , 4.8525 ± 0.5715 , and 4.645 ± 0.989 seconds for 25%, 50% and 75% power and average grooving time for the transversal setting was 5.22 ± 0.758 , 4.77 ± 0.83 , and 4.63 ± 0.69 seconds for 25%, 50%, and 75% power, respectively as shown in figure 2. The difference in grooving times between longitudinal and transversal setting at 25%, 50%, and 75% power was found insignificant ($P > 0.05$). Between the longitudinal settings tested, there was no difference in the grooving times ($P > 0.05$) but in transversal settings, the grooving times were statistically different as the power increased ($P = 0.035$).

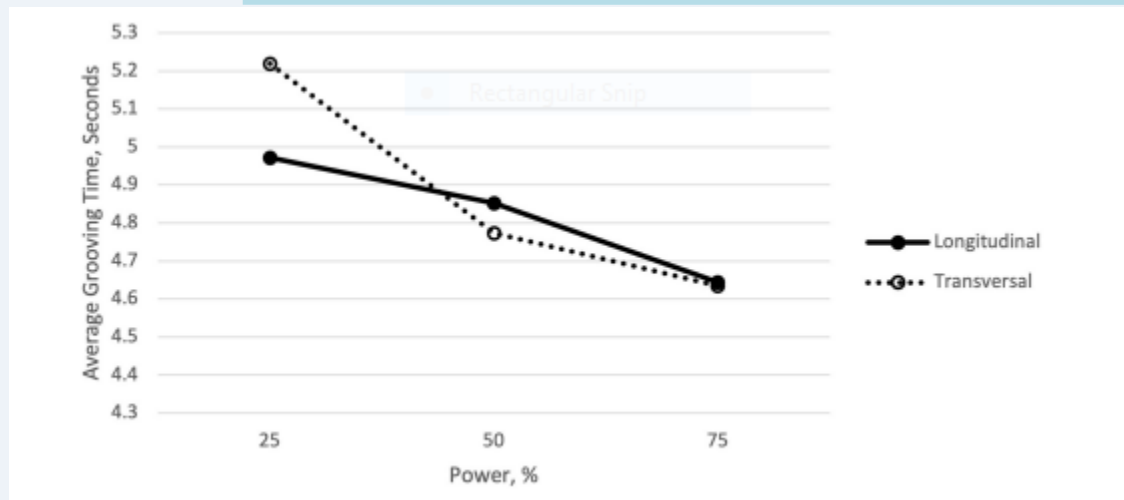


Figure 2: Average grooving times for longitudinal and transversal settings

Discussion:

Grooving efficiency is a vital attribute during phaco as the duration of phaco and the amount of dissipated energy during phaco increase the likelihood of damage to the corneal endothelium. More power typically increases efficiency; however, increased power may increase adverse effects caused by chatter and excess delivered energy. Therefore, the goal of phaco settings should be to find an optimal power setting with sufficient power to minimize duration of phaco without increasing power to the point of excessive chatter that may nullify the benefits of the higher power

CONCLUSION:

The study concludes that grooving time does not aid in selection between transversal and longitudinal phaco using the Whitestar Signature Pro system. Surgeon preference would appear to be vital important in choosing the ultrasound mode used during the grooving step of cataract surgery

REFERENCE:

1. Wilkinson SW, Ungricht EL, West WB, Harris JT, Zaugg B, Olson RJ, Pettey JH. Comparison of Phacoemulsification Grooving Efficiency in Longitudinal vs Transversal Handpieces. Clinical Ophthalmology. 2023 Dec 31:191-5.
2. Thomson RS, Bird BA, Stutz LA, Heczko JB, Bernhisel AA, Barlow WR, Zaugg B, Olson RJ, Pettey JH. The effect of increasing power when grooving using phacoemulsification. Clinical Ophthalmology (Auckland, NZ). 2019;13:611.
3. Gurnani B, Kaur K. Phacoemulsification. InStatPearls [Internet] 2021 Dec 31. StatPearls Publishing.
4. Ramshekar A, Heczko J, Bernhisel A, Barlow W, Zaugg B, Olson R, Pettey J. Optimizing tip diameter in phacoemulsification of varying lens sizes: an in vitro study. Clinical Ophthalmology. 2021 Nov 17:4475-84.

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Automated grading system of retinal arterio-venous crossing patterns: A deep learning

INTRODUCTION:

Retina provides a window to directly visualize vascular structure in vivo, and ophthalmologic examination has been regarded as an important routine for detecting not only eye diseases but also ocular manifestations of cardiovascular diseases or their accumulated risks¹. Accurate artery/vein classification is important for the early diagnosis of various retinal vascular diseases, such as diabetic retinopathy, age-related macular degeneration, glaucoma, hypertension and other cardiovascular diseases². Assessment of arterio-venous crossing points in retinal images provides rich cues for screening arteriosclerosis and for evaluating accumulated cardiovascular risks. Our method can find and validate possible arterio-venous crossing points, for which the severity grade is predicted.

METHODS:

For ophthalmologist, the proposed pipeline is three-fold to replicate a diagnostic process. First, adopting segmentation and classification models to automatically obtain vessels in a retinal image with the corresponding artery/vein labels and find candidate arterio-venous crossing points. Second, a classification model was used to validate the true crossing point. At last, the grade of severity for the vessel crossings is classified. To address the problem of label ambiguity and imbalanced label distribution, we propose a new model, named multi-diagnosis team network (MDTNet), in which the sub-models with different structures provide different decisions. MDTNet unifies these diverse theories to give the final decision with high accuracy.

RESULTS:

The crossing point validation performances are shown in the left part of Table 1. Study results show that pre-training (PT) and data augmentation (DA) can improve the overall performance of the crossing point validation. The Inception model with PT and DA achieved the best recall and the second-best precision. Note that PT and DA will not change the running time of the model because they do not modify the network structure.

This study also adopted Cohen's kappa, which can measure the agreement between the ground-truth labels and predictions. We can see that, compared with the focal loss models, the Dense Net can achieve higher overall accuracy with the CE loss. However, the combination of different

models, different losses, as well as different γ values can boost the performance. MDTNet achieved the highest performance in this experiment when $n = 3$. As figure 3 show two examples for the crossing point validation. The model might find the vein, track it down, and reach the conclusion that it lies above the artery are from the severity grade prediction.

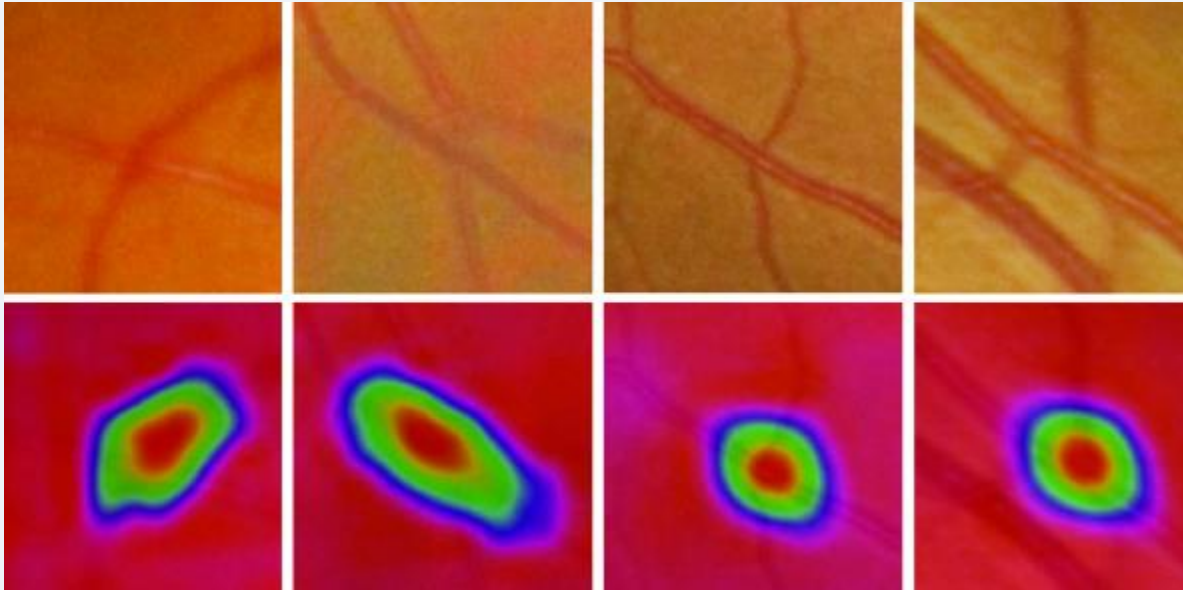


Figure:2- Crossing point validation model and are from the severity grade prediction model.

CONCLUSION:

Study concludes superiority of this method, achieving over 91% accuracy and whole process can be checked to see how the grading was determined as it is designed to be a step-by-step approach replicating ophthalmologists' diagnostic process. Therefore, the proposed method can help as supporting tool for experienced ophthalmologists to efficiently grade the images in a consistently reproducible manner

REFERENCE:

1. Li L, Verma M, Wang B, Nakashima Y, Nagahara H, Kawasaki R (2023) Automated grading system of retinal arterio-venous crossing patterns: A deep learning approach replicating ophthalmologist's diagnostic process of arteriolosclerosis
2. Wang Z, Lin J, Wang R, Zheng W. Retinal artery/vein classification via rotation augmentation and deeply supervised U-net segmentation. In Proceedings of the 2019 4th International Conference on Biomedical Signal and Image Processing (ICBIP 2019) 2019 Aug 13 (pp. 71-76).
3. Li L, Verma M, Nakashima Y, Kawasaki R, Nagahara H. Joint learning of vessel segmentation and artery/vein classification with post-processing. In Medical Imaging with Deep Learning 2020 Sep 21 (pp. 440-453).

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A Rare Case Report on Bilateral Congenital Retinal Macro vessel

INTRODUCTION:

Congenital retinal macro vessel (CRM) is defined as aberrant retinal vessel that crosses the macula and supplies or drains the retina above and below the horizontal raphe. The prevalence of CRMs is estimated at 1 in 200,000 and in many cases, CRMs show no specific symptoms and been diagnosed incidentally during retinal examinations². In case of retinal branch artery occlusion, cavernous haemangioma, retinal artery macro aneurysm, retinal deep capillary ischaemia, retinal detachment and vitreous haemorrhage, Visual loss may be reported³. The aim of this study is to report the rare case of Bilateral Congenital retinal macro vessel (CRM)

CASE REPORT:

A 40-year-old male known history of diabetes mellitus, dyslipidaemia, and hypertension for the last eight years presented clinic for diabetic retinopathy screening. On examination reveals that best corrected visual acuity was 6/6 in both eyes. Slit lamp examination of the anterior segment was found normal in both eyes.

Grade 2 hypertensive retinopathy with optic disc collateral vessels was found through dilated fundus examination revealed bilateral. An aberrant vessel was found originating from the optic nerve head and traversing the papillomacular bundle infer temporally was found. In the right eye, the vessel gives off a branch that crosses superiorly to supply the fovea, whereas in the left eye, the entire vessel crosses the horizontal raphe as shown in figure 3. The calibre of the vessel was same as to that of a retinal artery in both eyes.

Discussion:

Most cases of congenital retinal macro vessel are found incidentally with no impact on visual acuity so it is difficult to determine its prevalence. Conjunction with vitreous haemorrhage, foveal cyst, serous retinal detachment, branch retinal artery occlusion, macro aneurysm, telangiectasia, macular haemorrhage, or cavernous haemangioma was rare.

Fundus fluorescein angiography findings include early filling with delayed emptying of the vessel and the enlargement of FAZ occasionally. Angiography include dilated capillaries, areas of capillary non-perfusion, and dye leakage⁴.

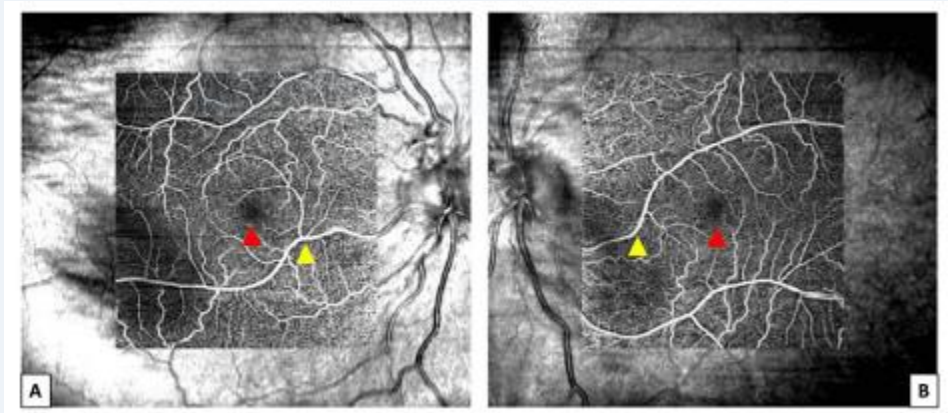


Figure:3 Congenital Retinal Macro vessels

Conclusion:

A case report on congenital retinal macro vessel was reported and multimodal imaging techniques that were used to confirm the finding indicated that the vessel is arterial

Reference:

1. Ismaeel D, Keskin S, Dallali F. Bilateral Congenital Retinal Macro vessel: A Case Report. Cureus. 2023 Jan 8;15(1)..
2. Okamoto R, Nishida K, Hara C, Wakabayashi T, Sakaguchi H, Nishida K. Spontaneous Resolution of Macular Edema with Abnormal Vessel Crossing near the Central Macula by Congenital Retinal Macro vessel. Case Reports in Ophthalmology. 2022;13:441-5.
3. Kohli P, Mishra C, Baliga G, Rajan RP. Multimodal imaging of congenital retinal macro vessel with secondary foveal hypoplasia. BMJ Case Reports CP. 2022 Apr 1;15(4):e249563.
4. Bhatia HK, Sharma S, Laxminarayana P (2015) Congenital Retinal Macro vessel with Normal Visual Acuity: A Case Report. Int J Ophthalmol Clin Res 2:017

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