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Systemic Corticosteroid Therapy in Acute Non-Arteritic Anterior Ischemic Optic Neuropathy: A Systematic Review and Reconstructed Aggregate-Data Meta-analysis

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Abstract

Background:The role of systemic corticosteroidsinacute non-arteritic anterior ischemicoptic neuropathy (NAION)remains controversial.Earlyobservationalstudies suggested benefit, whereas randomized trials havegenerallyfailed todemonstratea clinically meaningfulimprovementinfinalvisualacuity.

Objective:Toidentify comparativeevidenceevaluatingsystemic corticosteroidsforacute NAIONand perform a transparent aggregate-data meta-analysis offinalbest-corrected visualacuity(BCVA).

Methods:Publishedcomparativestudies ofsystemiccorticosteroids inacuteNAIONwere identifiedthroughatargetedliteraturesearchandreference screening.Intravitreal corticosteroidstudieswereexcluded fromtheprimarysynthesis.Sixstudiesprovided extractablefinalBCVAdata:Hayreh 2008,Rebolleda 2013,Kinori2014,Pakravan 2016, Pakravan2017,andSaxena2018.FinalBCVAwasanalyzeda smeandifferenceinlogMAR (steroidminuscontrol).ADerSimonian–Lairdrandom-effectsmodelwasused.

Results:Six studies contributed 610 eyes (367 steroid-treated and 243 controls).Individualmean differences ranged from −0.10 to +0.26 logMAR. The pooled random-effects mean difference was -0.01logMAR (95% CI-0.09to 0.07),withI^2=1.1%.Thus,no statistically significantdifferenceinfinal BCVAwas demonstrated.Somestudiesshowedfasteroptic-disc-edemaresolutionwithsteroids,butthisstructuraleffectwas notconsistently accompaniedbybetterfinalvisualfunction.Onesmallcoho rtreportedsteroid-related complicationsin3of10treatedpatients.

Conclusion:Reconstructedaggregate-data evidence doesnotdemonstrate a statisticallysignificantorclinicallyimportantimprovementin finalBCVAwithsystemiccorticosteroid therapy for acute NAION.The evidence islimitedby smallrandomizedtrials,non-randomized allocationinseveralstudies,heterogeneousregimens,andi ncompletesafetyreporting. Systemiccorticosteroidsshouldnotbeconsideredroutinestan dardtherapy foracuteNAION outsidecarefullyselectedclinicalorresearchsettings.

I. Introduction

Non-arteriticanteriorischemicopticneuropathy(NAION)isan acuteischemicdisorderof theopticnerveheadand an importantcauseofsudden painlessmonocularvisuallossin adults.Itistypically associatedwithoptic-discedema,arelativeafferentpupillary defectand characteristicvisual-fieldloss.Systemicvascularriskfactorsarecommon. Systemic corticosteroidshave beenproposedbecause their anti-inflammatory andanti-edematouseffectscouldreduceoptic-nerve-headswellingandtheoreticallyrelieve secondarymicrovascularcompression.Earlysmallreports suggestedvisualbenefit,but thesestudieswerenotrandomized.Hayreh and Zimmerman laterreported alarge prospective patient-choice cohort inwhichearly oralprednisone was associatedwithhigherrates ofvisual-acuityand visual-field improvement.Inpatients treated within 2 weeks with initialacuityof20/70orworse,69.8%improvedcomparedwith 40.5%ofuntreatedpatients; however,treatmentallocationwasnotrandomizedormasked.[1,2]

Later controlledevidence has beenlesssupportive.Pakravanet al.foundno significantdifferenceinfinalvisualfunctionorstructuralout comesafterhigh-doseintravenous methylprednisoloneinarandomizedtrial.Saxenaetal.simi larlyfoundnosignificant difference infinalBCVA inarandomizeddouble-blindtrial,despitefaster resolutionof disc edema. [3,4] A2019PRISMA-compliantmeta-analysisreportednosignificant BCVAbenefit (WMD −0.02 logMAR,95%CI−0.10to0.06;P=.69).[5]A2022meta-analysisreportedpositivepooled effects but wassubsequentlyretractedandis therefore excludedfrom the evidentiarybasis ofthismanuscript.[6]A2024reviewconcludedthat no

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treatment foracute NAIONcurrently hashigh-qualityevidencedemonstratingimprovedvisualoutcomes.[7]

II. Materials and Methods

A targetedliteratureresearchwasconductedon30August2026usingPubMedandlinkedfull-textsources.SearchconceptsincludedNAION/non-arteriticanteriorischemicoptic neuropathycombinedwith corticosteroid, steroid, prednisone, prednisolone, methylprednisoloneandpulsetherapy.Referencelistsof relevantreviewsandmeta-analyses werescreened.
Eligible studiesincludedadultswithacute NAION,asystemic corticosteroidintervention,a placebo/no-treatment/non-steroidcomparator,andextractablefinalBCVA data.Intravitreal corticosteroidstudieswere excludedbecause the route andriskprofile differ materiallyfrom systemic treatment.
Theanalysisusedpublishedgroupmeans,standarddeviationsandsample sizes.The effect measurewas mean differencein finallogMARBCVA(steroid minus control), with negative valuesfavoringsteroids.Standarderrorswerecalculatedfrompublishedaggregatedata.A DerSimonian–Lairdrandom-effectsmodelwasused.Thereconstructedpooledestimate was -0.011logMAR (95% CI-0.095 to 0.072); Q=5.06, I^2=1.1%, P≈0.786.
Thisisanexploratory aggregate-datareconstructionandnotapatient-levelmeta-analysisoraprospectivelyregisteredsystematicreview.

III. Results

Sixsystemic-corticosteroidstudiescontributedextractablefinal-BCVAdata.Theycomprised one large prospective patient-choice cohort,two additionalnon-randomizedcomparative studies,oneprospectivecomparativestudyandtworandomizedtrials.Treatmentregimens variedfrom oralprednisone taperingschedulesto high-dose intravenousmethylprednisolonefollowedbyoralcorticosteroids.

IV. Discussion

Thereconstructedanalysisdoesnotdemonstrateastatistically significantimprovementinfinalBCVAwithsystemiccorticosteroidtherapyforacuteNAION.Thepooledeffectwas closetozeroandtheconfidenceintervalcrossedthenullvalue.
The major source of apparentbenefitinthe historicalliterature isthe large HayrehandZimmermancohort.Itssizeandprospectivefollow-upareimportant, buttreatment allocationwasbased onpatientchoiceand theexaminerwasnotmasked.Theuntreated group alsodiffered in somebaselinecharacteristics.Thesefactors makeresidualselection biasandconfoundingdifficulttoexclude.[1,2]
Therandomizedevidenceismoreconsistentwithabsenceofaclinicallyimportantfinal-visual-acuity benefit.In the 2016 Pakravan trial, 30 patients received high-dose intravenous methylprednisolonefollowedbyoralprednisoloneand30receivedplacebo;therewereno significantbetween-groupdifferencesinfinalvisualfunctionorstructure.[3]Inthe2018 Saxena trial,19patients receivedprednisone and19 placebo;finalBCVA was similar despitefasterdisc-edema resolution and changes in visual-evoked-response parameters.[4]
Thedistinctionbetweenanatomicalandfunctional outcomesisimportant.Corticosteroids may reduce vascular permeability andoptic-disc swelling,butNAIONcausesearly ischemic axonalinjury.Onceaxonsareirreversibly damaged,subsequentreductionof edemamay not restore vision.Thus,faster disc-edemaresolutionshouldnotautomatically be interpretedasneuroprotection.
Systemicsafetyalsomatters.Corticosteroidsmaycausehyperglycemia,blood-pressure elevation, mood or psychiatric effects, gastrointestinal symptoms and other complications. Rebolleda et al.reported steroid-related complications in 3 of 10 treated patients, althoughtheestimateishighlyimprecisebecauseofthesmallsample.[8]
The 2022 positive meta-analysisshouldnotbe usedto supporttreatmentbecause itwasformallyretracted.[6]Currentreviewevidenceinsteademphasizestheabsenceofhigh-qualityevidenceforatreatmentthatimprovesvisualoutcomesin acuteNAION.[7]

V. Limitations

Theprincipallimitationsarethesmallnumberofeligiblesystemic-steroidstudies,reliance on published aggregate rather than individual-patient data,variation in treatment dose andtiming, differing studydesigns, and incomplete adverse-event reporting.Severalimportant studieswere non-randomizedandtherefore vulnerable to confounding.The analysisshouldnotberepresentedasaregisteredPRISMARevieworpatient-levelmeta-analysis.

VI. Conclusion

Current comparative evidence doesnot demonstrate a statistically significant improvement infinalvisualacuitywith

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systemiccorticosteroidsforacuteNAION.Corticosteroid smay accelerateoptic-disc-edemaresolution,butevidencethatthisanatomicaleffectpr oduces meaningfullong-term visualrecovery is insufficient.Routine systemic corticosteroidtherapy therefore cannot currentlybe recommendedas standardtreatment for acute NAION.Future multicenterrandomizedtrialsshouldusestandardizedregi mens,earlytreatment,objective OCT andvisual-fieldendpoints,clinically meaningfulvisualoutcomes andsystematic adverse-eventreporting.

Table1.Studiesincludedintheaggregate-dataanalysis

Study	Design	Steroid n	Control n	Steroidregimen	Final steroid	Final control	WMD
Hayreh 2008	Prospective patient-choice cohort	244	177	Prednisone 80 mg/day,taper	0.44	0.51	-0.07
Rebolled a 2013	Retrospectiv ecohort	10	27	Prednisone 80 mg/day,taper	0.66	0.40	+0.26
Kinori 2014	Retrospectiv e case-control	24	24	IV methylprednisolon e 1g/day ×3 d, then oral prednisone	0.61	0.43	+0.18
Pakravan 2016	Randomized clinicaltrial	27	30	IV methylprednisolone500mg BID×3d, then oral prednisolone	0.73	0.71	+0.02
Pakravan 2017	Prospective cohort	43	30	IV methylprednisolon e then oral prednisolone	0.71	0.71	+0.00
Saxena 2018	Randomized double-blind trial	19	19	Prednisone 80 mg/day,thentaper	0.50	0.60	-0.10

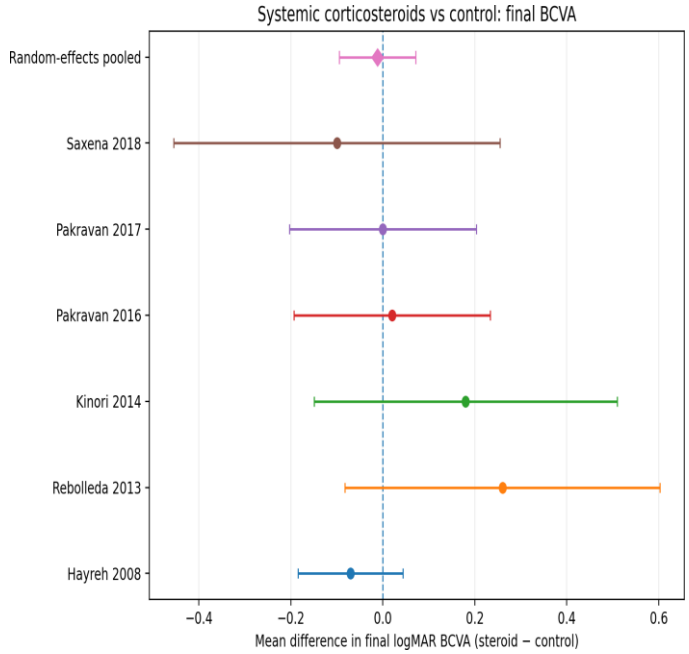

Figure1.Reconstructedrandom-effectsanalysisoffinalBCVA.Errorbarsrepresent95% confidenceintervals;negativeeffectsfavorsteroids.

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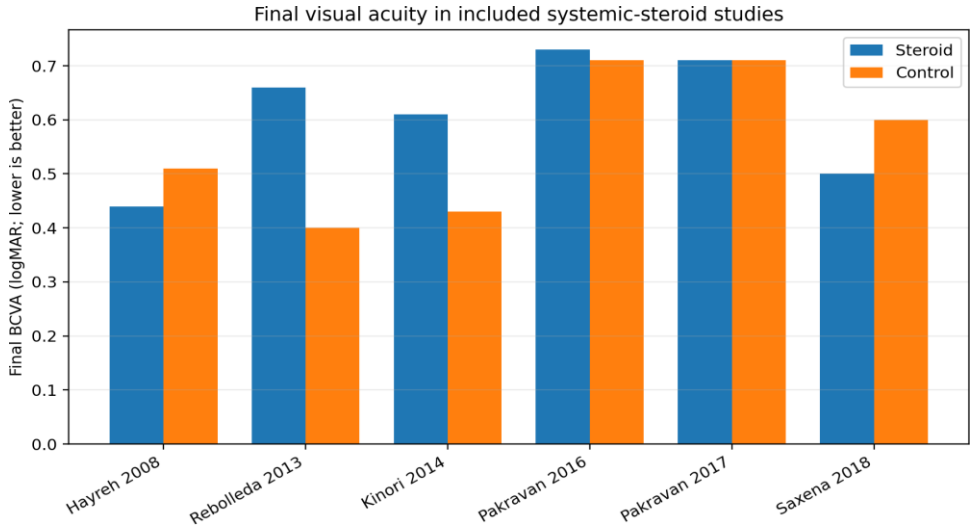

Figure2.FinalmeanlogMARBCVAinthesixsystemic-corticosteroidstudies.

3.1Structuraloutcomes

In theHayrehcohort,median timetooptic-disc-edema resolution was 6.8 weeks in patients treatedwithin2weekscomparedwith8.2weeksinuntreatedpatients(P<0.0001).The Saxenarandomizedtrialalsoreportedfaster OCT-measuredresolutionofdiscedemaat1 month.Thesefindingssupportananti-edematouseffectbutdonotestablishimprovedlong-termvisualfunction.[1,4]

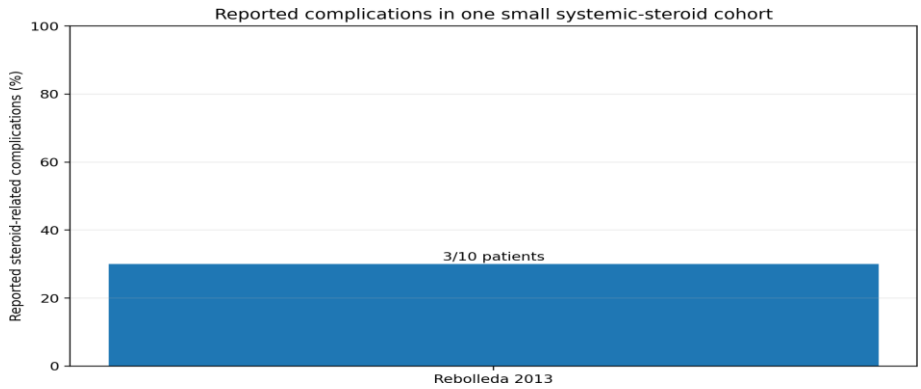

Figure 3.Reported steroid-related complications in Rebolleda et al.; this is a single-studyestimateandisnotapooledadverse-eventrate.

References

[1]. Hayreh SS, Zimmerman MB. Non-arteriticanteriorischemicopticneuropathy: roleof systemic corticosteroid therapy.Graefes Arch Clin Exp Ophthalmol.2008;246:1 029–1 046.doi:1 0.1 007/s0041 7-008-0805-8.

[2]. LeeAG,BiousseV.Shouldsteroids beofferedtopatients withnonarteriticanterior ischemic optic neuropathy (NAION)? JNeuroophthalmol.201 0;30:1 93–1 98.

[3]. PakravanM,Sanjari N,Esfandiari H,PakravanP,Yaseri M.Theeffectofhigh-dose steroids,andnormobaric oxygentherapy,onrecent onset non-arteritic anterior ischemicopticneuropathy: arandomizedclinicaltrial.GraefesArchClinExpOphthalmol. 2016;254:2043–2048.doi:10.1007/s00417-016-3451-6.

[4]. SaxenaR,SinghD,SharmaM,JamesM,SharmaP, MenonV.SteroidsversusNoSteroids in Nonarteritic AnteriorIschemicOpticNeuropathy:ARandomized Controlled Trial. Ophthalmology.2018;125:1623–1627.doi:10.1016/j.ophtha.2018.03.032.

[5]. ChenJ,ZhuJ,ChenL,HuC,DuY.Steroidsinthetreatmentofnonarteriticanterior ischemic optic neuropathy: A PRISMA-compliant meta-analysis.Medicine (Baltimore).2019;98:e17861.doi:10.1097/MD.0000000000017861.

[6]. ZhouP,ZhangJ,QiY.TheEfficacyofGlucocorticoidsintheTreatmentofNonarteritic Anterior Ischemic Optic Neuropathy:A Systematic Review andMeta-Analysis.ComputMath MethodsMed.2022;2022:2935992.Retractedin 2023.

[7]. ParthasarathiP,MossHE.Reviewofevidencefortreatmentsofacutenonarteritic anterior ischemic optic neuropathy.Eye.2024;38:2267–2278.doi:10.1038/s41433-024-03136-8.

[8]. Rebolleda G, Pérez-López M, Casas-Llera P, Contreras I, Muñoz-Negrete FJ.Visualandanatomicaloutcomes of non-arteritic anterior ischemic optic neuropathy withhigh-dosesystemic corticosteroids.Graefes Arch Clin Exp Ophthalmol.2013;251:255–260. doi:10.1007/s00417-012-1995-7.

[9]. KinoriM,etal.Visualoutcomeof mega-doseintravenouscorticosteroidtreatmentinnon-arteriticanteriorischemicopticneuropathy–retrospectiveanalysis.BMCOphthalmol. 2014;14:62.

[10]. PakravanM,etal.Theeffectofcombinedsystemicerythropoietinandsteroidonnon-arteriticanteriorischemicopticneuropathy:aprospectivestudy.CurrEyeRes.2017;42:1012–1018.