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RESEARCH ARTICLE

EFFECT OF DEXAMETHASONE AS AN ADJUVANT TO BUPIVACAINE IN ULTRASOUND GUIDED INTERSCALENE BRACHIAL PLEXUS BLOCK IN UPPER ARM SURGERIES

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Abstract

Background: Ultrasound (US) in regional anaesthesia offers a new standard in nerve location and identification, allows real-time imaging of nerves and direct needle guidance.In present study we have access efficacy and safety of Dexamethasone as adjuvant to US guided Interscalene block for Upper arm surgeries.

Aims: The study was conducted to compare the efficacy of Dexamethasone as an adjuvant to Bupivacaine in ultrasound guided interscalene brachial plexus block to provide intraoperative anaesthesia and postoperative analgesia in patients undergoing upper arm surgeries and to evaluate Hemodynamic Stability

Methods: Present study was conducted at tertiary care hospital on 60 patients posted for elective upper arm surgeries, with ASA grade I and II, in age group of 18-70 years. The patients were randomly divided into 2 groups – Group A and Group B. All patients were given ultrasound guided interscalene block with 15 ml of 0.5% Plain Bupivacaine. Inj. Dexamethasone 8mg was added to local anaesthetic drug in Group A and 0.9% normal saline 2ml was added in Group B. All patients received 17 ml of volume of study drug perineurally. All blocks were successful to provide surgical anaesthesia and analgesia.Both the groups were evaluated for onset and duration of sensory and motor blockade, duration of analgesia, perioperative haemodynamic stability, total number of analgesic requests in 24 hours and any adverse reactions/complications.

Results: Both the groups were comparable with respect to patient characteristics. In our study, Onset of sensory block was faster in Group A (3.866 ± 1.33 mins)compared to Group B (7.566 ± 1.67 mins) (p value <0.0001). Onset of motor block was faster in Group A (7.933mins) compared to Group B (11.733 mins) (p <0.0001). Duration of mean sensory block was longer in Group A (904 mins) compared to Group B (305.33mins)(p<0.0001).Duration of mean motor block was longer in Group A (861 mins) compared to Group B (264.33mins) (p< 0.0001). Mean Duration of analgesia was longer in Group A (1455.86

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mins)compared to Group B (806.16 mins) (p<0.0001). Total number of analgesic requests was less in Group A (1.2) compared to Group B (2.37) (p <0.0001).Both groups showed perioperative haemodynamic stability. And no adverse reactions or complications were observed in any patient in Group A, whereas 2 patients (6.67%) in Group B had Postoperative Nausea Vomiting.

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Introduction:-

Peripheral nerve block providesgood operatingconditions, provideexcellent peri operativeanalgesiaTheycause the least interferencewithvitalphysiologicalfunctions of the body, reduction instressresponse, systemicanalgesicrequirements,avoiding polypharmacy,opioidrelatedside effectsand generalanaesthesia requirements[19].

Upperarm surgeriescanbeperformedundergeneralorregional anaesthesia.Theupperextremitiesreceiveitsinnervationsfrom the brachialplexus.Manyapproachesandtechniquesareavailabletoblockthe brachial plexus. Itcanbe blockedthroughvariousanatomicalapproaches suchasinterscalene,supraclavicular,infraclavicularandaxillary approaches[6].

TheUltrasound-guidedregionalanaesthesia (UGRA) isa growing areaof bothclinicalandresearchinterest[31].Ultrasound(US)inregional anaesthesiaoffersanew standardinnervelocationandidentification, allowsreal-time imagingofnervesanddirect needle guidance.˙ Ithasseveralbenefits including fasteronset and reduction in thedose of local anaesthetic. Ultrasoundguidedneedle placementmayreduce the riskof complications andincreasethe accuracyof theblock.[(1,5)]

Variousadjuvantlike,dexamethasone,dexmedetomidine,clonidine, magnesium,midazolam,havebeenusedtoprolongdurationof analgesia of nerve blockswithvaryingdegree ofsuccess.

Dexamethasoneisa glucocorticoidwhichareknownfortheir anti- inflammatory,analgesic, immunosuppressive, andantiemeticproperties, they exerttheiractionby inhibitingphospholipaseA_2,inadditionto changesincellfunctioninducedby glucocorticoidreceptoractivation. Steroidsinducea degree of vasoconstriction,acting likeepinephrine by decreasinglocalanestheticabsorption. Another hypothesisisthat dexamethasonemayactlocally onnociceptiveC-fiberstoincreasethe activityofinhibitorypotassiumchannels,thusdecreasingtheiractivityand relievingpain.[3]

Methods:-

After talking approval of IRB,,60 adult patients of upper arm surgeries enrolled Inthisprospectiverandomizedobservationalstudy, afterobtaining approvalfrom hospitalInternationalReview Board, 60adult patientswithphysicalstatusASA gradeI andIIaged between18–70years, scheduledforupper arm surgeries were included inthisstudy.StudywasconductedatTertiaryCareHospital,duringtheyearof2019- 2021.

Selectionofpatients:

InclusionCriteria

Patientaged18–70yearsEithergender
HavingASAgradeIandIIPostedfor elective upperarmsurgeries

ExclusionCriteria

ASAgrade ≥III ,Obesepatients,pregnantpatients,Patientswith distortedneckanatomy

PatientswithMallampaticlassificationGrade3,Knownorsuspectedcoagulopathy

Patientswithknownhypersensitivityorcontraindicationtothestudy drugs,Neurologicaldeficitinvolvingbrachialplexus ,Infectionatsiteof block,Patientrefusaltoparticipate, Patientwithchronicpainandusing chronic analgesic medications

Method:-

Thorough pre-anaestheticevaluationwas carried out onday before surgeryPatientswereexplainedabouttheprocedure ,Informedwrittenconsentforprocedurewastakenfromthepatient andhis/hercloserelative.All patients wereexplainedaboutVisual Analoguescale (VAS) andwere made wellconversantwithit.Allpatientswereadvisednilbymouthasper standardfasting guidelines.

Preparation:
Anintravenouslinewassecuredand intravenousfluidsstarted.After taking patient in the operation theatre,Pulseoximeter,Non-invasive bloodpressurecuffandECGelectrodeswereappliedandbaselinepulse, bloodpressure,oxygensaturationandrespiratoryratewere recorded

Premedication:
AllpatientsweregiveninjectionMidazolami.v.0.02mg/kg10-15min priortosurgery.The patientswere randomlydividedinto2studygroups.

GroupA:-
InjectionPlainBupivacaine0.5% - 15cc
InjectionDexamethasone 2ml(8 mg– i.e.,4mg/ml)

GROUP-B :-
InjectionPlainBupivacaine0.5% - 15cc
Injection0.9% Normalsaline-2cc.
Allpatientsreceived17mlof volume of studydrug perineurally.

Under all aseptic precautions,patients in supine position, arms adductedandheadturnedtooppositeside, ultrasoundscanning usinghighfrequencylinearprobe wasdone. US Transducerposition:Transverseonthe neck

There are2differentapproaches:[12]

1. **Traceback**" approach:
Supraclavicular fossa is scanned first to identify the subclavianartery withthe nerve trunkswhich lie posterolateraltothe arteryThenervetrunkslieincloseproximityandaretermedas Bunchof Grapesappearingas hypoechoic (black) halos surroundedbyhyperechogenic(white)thinrimofconnective tissue.
Movecephaladandtracethebunchofgrapeswhichbecome arrangedina linear mannerbetweentwoscalene muscles.

1. **Medialtolateral**approach:

- PuthighfrequencylinearprobeoncricoidcartilageatC6level.
- Identify- trachea, thyroidgland ,-Movelaterallyidentifyingcarotidartery,internaljugularvein, SCM muscle,scalenus anteriorandscalenus medius from medialtolateral.Once the groove is identified,theprobe adjustmentsaremadeforthebettervisualizationoftheovalto roundanechoic nerveroots of the brachial plexusshowing typical"**traffic signal**" sign.

-Identify vertebral artery in same image posteriorly and medially.Localanaesthetic infiltration2-3mlat thesite ofpuncture.

Needle:
A23G1 andhalfinchblockneedleisused.

Needleapproach:
In-planeapproach

Target:
Needlebetweentheplexusandanteriorborder ofscalenus medius.

Volume:
GroupA:InjectionPlainBupivacaine 0.5% - 15cc and InjectionDexamethasone 2ml(8 mg)
GroupB:InjectionPlainBupivacaine 0.5%- 15cc and InjectionNormalsaline- 2cc

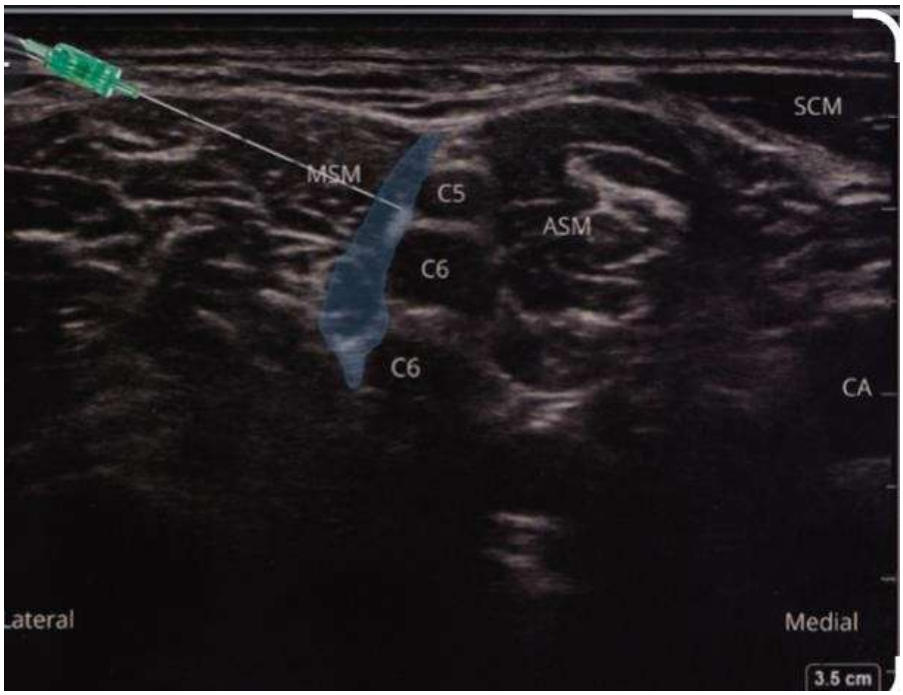


Figure 1:- SCM – Sternocleidomastoid, MSM – Middle Scalene muscle, ASM – Anterior Scalene muscle, CA – Carotid Artery.

Figure2:- Probepositioning andinplaneapproachof needle insertion(22)

Patientswereobservedfor followingparameters–

Onsetanddurationofsensoryblock
Onsetanddurationofmotorblock
Perioperativevitals
Total duration of analgesia
Complications/Adverse reactions
Time forfirstrescueanalgesia
Postoperative analgesic requestsin24hours

Sensoryblock:

SensoryblockwasgradedaccordingtoHollmenscale:(5,40)

Grade 1 – Normalsensationofpinprick

Grade2 – Pinprickfeltassharppointedbutweakercompared with same area inother limbs

Grade 3 – Pinprickrecognizedastouchwithbluntobject

Grade 4 – Noperceptionofpinprick

Onset of sensory block was defined as the time between the administrationofthedrugandestablishmentofGrade3onHollmenscale.

Motorblock:

MotorblockwasgradedaccordingtoHollmenScale (28)Grade1–Normalmuscle function Grade 2–Slightweaknessinfunction Grade 3–Veryweakmuscular action Grade 4–Completelossof muscle action

Onsetofmotorblock wasdefinedasthetimebetweenthe administrationofthe drugandestablishmentofGrade3onHollmen scale.Surgery wasallowedtobeginafterachievementofsensory blockage grade3andmotor blockagegrade3 ofHollmenscale.Vitalsatthe time of incisionwerenoted.

SuccessofBlock :WhenGrade3 ofHollmenScalewasachieved,it wasconsideredassuccessofblockandsurgerywasallowedtostart.

Failureofblockwasconsideredifsupplementationofany typeof generalanaesthesia(Inj.Ketamine2mg/kg/Inj.Propofol2.5mg/kg) wasneededandfailureof blockwasmanagedby supraglotticairway device insertion(IgelInsertion).

Intra-operativehemodynamic parameters:

Patientswere observedforintra-operative vitalsperiodicallythroughout the operationandrecordedat the timeof block,atthe timeofincision thenevery5minutesfor15minutesafterincision,thenevery15minutes for 1hour andeveryhalf anhour thereafter.

Patientsreceived NBM + maintenance solutionof Ringer lactate as calculatedaccordingtotheHolidaySegarformula.

Perioperative blood loss insurgerywasmanagedwithcrystalloids, bloodandbloodproducts.Achangeof 20%inmeanarterialbloodpressurefrom baseline,is defined asHypertension orHypotension and corrected pharmacologically.Achangeof20% inHeartratefrom baseline,is definedas

TachycardiaorBradycardia(Bradycardiaiseither<20%ofbaseline or<60beats/min)andcorrectedpharmacologically.

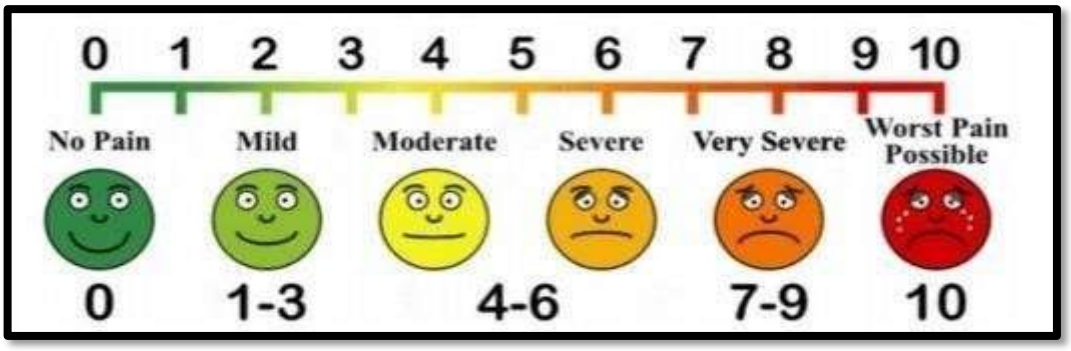
HypertensionandTachycardiaweretreatedbyInj.Fentanyl50mcgintravenously.Hypotensionwasmanagedbyi.v.fluidsandInj.Mephentermine6mgi.v.inalliquotes.

BradycardiawascorrectedbyInj.Atropine 0.6mgi.v.

IntraoperativeRespiratorydepressionisdefinedasRR<12/min orSpO2<90%-Treatedwith100% oxygenbymask.

Durationofsurgerywasnoted.Itwasdefinedasthetimefrom giving theblocktillcompletionofclosureof theincisionsiteofsurgery. Intraoperatively,patientswereobservedforadversereactions ofdrugs/ complicationsof proceduresand treatedaccordingtostandard guidelines.Nausea/vomiting:Wasassessedby4 pointscale–

VAS(26)



Grade		Treatment
1	NoNausea/vomiting	Ventimaskoxygenation
2	Minor form	andheadlowposition
3	Moderate form	Inj.Ondansetron4mg
4	Severe form	i.v.

For LASTintralipidemulsionwaskeptready. IfDifficultyinbreathingoccurred,airwayassistancewasgivenand oxygenationwasprovided.

ForHoarsenessofvoiceandHorner'sSyndrome(ptosis,anhidrosis,miosis,sinkingofeyeballintotheface,inabilitytocompletelyclose oropentheeyelid) patientswerereassuredandoxygenation with venturimaskwasgiven.ForConvulsions,Inj.Thiopentonesodium5-6mg/kgwaskept ready.

Aftercompletionofsurgery,durationofsurgerywasnotedandpatients were shiftedtoPostAnaesthesia Care Unit(PACU).

Post-operativemonitoring:
Postoperativemonitoringwasdoneperiodicallyfor24hoursandrecorded everyhourlytill10hoursthen every2hourlytill12hours,then6hourly till24hours.

Durationofsensoryblockwas definedasthetime fromonset ofsensory blocktoreturnofnormalsensationfrom pinprickaccordingtoHollmen scale(Grade1)

Durationofmotorblockwasdefinedasthetimefrom onsetofmotor blocktorecoveryofmotorfunctionaccordingtoHollmenscale(Grade1)**Durationofanalgesia:**Totaldurationof analgesiawasthesummationof

Durationof surgery+time forfirstrescueanalgesia .
Post-operativelypatientswereassessedaccordingtovisualanaloguescore

Patientswereaskedtodescribetheirpainfrom0to10,where0 meansnopainand10meansworst pain.VisualAnalogScaleforpainassessment[50]

The duration of analgesia was counted till VAS ≥ 4. Rescue analgesiawasgiveninformofinj.Tramadol1mg/kgintravenously atthe VASscore ≥4alongwithInj. Ondansetron4 mg.VASwasobservedfor24hourspostoperativelyandmanaged<4 byanalgesic requestof Inj.Tramadol1mg/kgi.v. Numberofanalgesicrequestsin24hourswererecordedandpatients werewatchedfor blockrelated delayedcomplications like Pneumothorax,Hemidiaphragmaticparalysisandmanaged by standardprotocols.Patientswereobservedfortransientneurologicalcomplicationsin early andlatepostoperativeperiodforupto72hoursandalsofor delayinvoiding.

PatientswereinquiredforanydelayedNeurologicalcomplications for upto7days.

StatisticalAnalysis
Alldata were collectedinMicrosoftExcelSpreadsheet.

Statisticalanalysiswasdone bySPSS software.

Descriptivedataofboththegroupswerecomparedusingunpaired 't'tests.

Meanisusedtoderivethecentraltendencyofthedataata particular time inonestudygroup.

Standarddeviationisameasureofdispersionofasetofdatafrom itsmean.Categoricaldata wereanalysedbyChiSquare test.
'P'value<0.05wasconsideredstatisticallySignificant(S)and<0.001wasconsideredHighlySignificant(HS).'P'value> 0.05snon–significant(NS)

Observation & Results:-

Table1:- Comparisonof Demographicdata.

	GroupA (N=30)	**Group B(N=30)**	**pvalue**	**Inference**
Gender				
Male	17(56.67%)	17(56.67%)	-	-
Female	13(43.33%)	13(43.33%)		
ASAgrade (I/II)	10/ 20	17/ 13	-	-
Age(years)	48.46± 15.71	43.86±15.69	0.2611	NS
Weight(kgs)	59.3±5.49	60.76± 7.09	0.3762	NS
Height(m)	1.710.04	1.710.03	1.0	NS
BMI(kg/m^2)	20.30± 2.01	20.61 2.22	0.5729	NS

Durationof surgery (mins)	125.33±17.56	134.33±21.16	0.0782	NS

Table1showsvariousdemographicparameters anddurationofsurgeryin eachgroup(P >0.05)

Table 2:-Typesofsurgeries.

Type of Surgery	GroupA	GroupB
ProximalHumerusPHILOS Platting	17	18
HumerusEndersNail	3	-
ProximalHumerusTENS Nailing	-	1
GT CCScrew	1	1
DistalHumerusCCScrew	-	1
HumerusI/L Nail	1	-
HumerusShaft Platting	1	2
DistalHumerusPlatting	-	2
HumerusMIPPO Platting	-	2
HumerusEx- fix	3	-
HumerusEndersNailROI	1	2
Olecranon TBW +Kwire	1	-
Supraspinatusand InfraspinatusTear Repair	1	-
Open SupraspinatusTear Repair	-	1
Shoulder Arthroscopic Repair	1	-

AllsurgeriesinTable2 were successfullyperformedunderinterscalene block withoutanysupplementationof GeneralAnaesthesia.

Table 3:- Meansensory Andmotoronset.

Onset (mins) (inminutes) (N=30)	**GroupA (N=30)**	**GroupB (N=30)**	**pvalue**	**Inference**
Sensoryonset (Mean ±SD)	3.866± 1.33	7.566± 1.67	<0.0001	HS
Motor onset (Mean ±SD)	7.933± 1.25	11.733± 2.08	<0.0001	HS

Table4:- Meanheartratechanges.

Timeduration	**GroupA (N=30)** **Heartrate (permin) (Mean±SD)**	**GroupB (N=30)** **Heartrate (permin) (mean±SD)**	**pvalue**	**Inference**
PreoperativeMean HR	83.6±11.15	81.3 ± 10.14	0.4067	NS
INTRAOPERATIVEPERIOD				
Atthetime of induction	81.76 ± 10.89	83.06 ± 11.10	0.6487	NS
Atthetime of	80.73 ± 10.35	80.2± 10.68	0.8459	NS

incision				
15min	80.3 10.43	81.9 11.50	0.5746	NS
30min	80.2 10.57	81.56 10.79	0.6238	NS
45min	80.63 10.23	83.06 11.29	0.3859	NS
60min	80.5 10.28	82.96 10.95	0.3734	NS
75min	80.73 10.35	82.73 11.61	0.4841	NS
90min	80.8 10.37	83.26 11.31	0.3835	NS
105min	81.46 9.51	83.44 11.38	0.4676	NS
120min	82.52 8.80	82.59 11.39	0.9788	NS
135min	82.21 10.31	80.57 10.55	0.5449	NS
150 min	81.42 10.87	79.09 12.93	0.4530	NS
160 min	68.5 0.70	69.25 7.88	0.6056	NS
180 min	68.0 2.82	61.0 1.41	0.0882	NS

Table5:- Variationinmap.

Timeduration	**GroupA (N=30)**	**GroupB (N=30)**	**pvalue**	**Inference**
	MAP (mmHg) (Mean±SD)	**MAP (mmHg) (mean± SD)**		
Preoperative MAP	96.04 ± 8.18	95.57 9.62	0.8392	NS
INTRAOPERATIVEPERIOD				
Atthetime of induction	94.46 8.03	96.66 9.02	0.3225	NS
Atthetime of incision	94.0 8.10	94.93 8.59	0.6678	NS
15min	93.0 7.80	95.21 8.53	0.2993	NS
30min	93.84 7.97	94.55 8.53	0.7402	NS
45min	94.08 7.82	94.43 8.10	0.8654	NS
60min	95.0 8.06	94.8 8.5	0.9258	NS
75min	94.0 8.13	93.27 8.07	0.7283	NS
90min	95.06 8.39	95.32 8.83	0.9073	NS
105min	94.49 8.73	95.50 8.85	0.6580	NS
120min	93.0 8.91	95.61 8.77	0.2575	NS
135min	93.0 8.99	93.59 7.76	0.7865	NS
150 min	89.14 5.90	95.42 9.54	0.1399	NS
160 min	89.0 1.41	93.66 9.13	0.2035	NS
180 min	89.0 1.88	95.16 6.83	0.3007	NS

Table 5 shows that therewere no statistically significantchangesinmeanbloodpressureinperioperativeperiodsin eachgroup.

Table6:- Durationofmotorandsensoryblock.

Durationofblock (mins)	**GroupA (N=30)**	**GroupB (N=30)**	**pvalue**	**Inference**
Durationof motorblock (Mean±SD)	861±104.01	264.33±57.32	<0.0001	HS
Durationof sensoryblock (Mean±SD)	904±113.88	305.33±63.17	<0.0001	HS

Table7:- Meanpostoperativevas Score.

	GroupA Mean±SD	GroupB Mean±SD
Immediate	0	0
30mins	0	0
60 mins	0	0
120 mins	0	0
180 mins	0	0
240 mins	0	0
360 mins	0	1±0
480 mins	0	1.533±0.68
600 mins	0	3.1±0.84
720 mins	1.26±0.52	4±0
1080 mins	2.56±1.072	0
1440 mins	4±0	0

Table8:- Durationofanalgesia.

	GroupA (N=30)	GroupB (N=30)	pvalue	Inference
Durationof analgesia (minutes) (Mean±SD)	1455.86± 167.25	806.16± 62.47	<0.0001	HS

FromTable9itisevidentthat durationofanalgesia was prolongedinGroupAcomparedtoGroupB(pvalue <0.0001).

Table9:- TotalAnalgesicrequestsin24hours

	GROUPA	GROUPB	Pvalue	Inference
Total number of analgesic requestsin 24hours (MeanSD)	1.2 0.4068	2.370.4901	<0.0001	HS

Table10:- Postoperativecomplications

Complications	GroupA(N=30)	GroupB(N=30)
Tachycardia	Nil	Nil
fentBradycardia	Nil	Nil
Hypotension	Nil	Nil
LAST	Nil	Nil
Convulsion	Nil	Nil
Coughing	Nil	Nil
Nausea/vomiting	Nil	2
LocalHematomaat siteofblock	Nil	Nil
Hoarsenessofvoice	Nil	Nil
Horner'ssyndrome	Nil	Nil

Difficultyinbreathing	Nil	Nil
Pneumothorax	Nil	Nil
Hemidiaphragmatic paralysis	Nil	Nil
Neuropathy	Nil	Nil

AsillustratedinTable10only2patientsinGroupBhadPONVGrade3 (6.67%) whichwasmanagedwithInj. Ondansetron4mgi.v.Nopatientsneededanyadditionalfentanylsupplementationorairway assistance foroxygenation.Therewerenotransient/delayedneurologicalcomplications/observedin anypatientof eachgroup.

Discussion:-

Inrecentyears,there hasbeena growinginterest in peripheral nerveblocksforsurgical anaesthesiaandanalgesia. Thedevelopmentoflocal anaestheticagentswithlowertoxicity andlongdurationofactionhad contributed tothischange iItassociatedwithmultiple benefits including reduced morbidity andmortality,superiorpostoperativeanalgesia,cost-effectiveness,anda lowerrate ofseriouscomplications.However,itis highlydependent ontheaccuratedeliveryofacorrect doseoflocal anaestheticstoattainsuccessandtoavoidrarebutpotentially devastating nerve damage.One ofthe principle challengesinregionalanaesthesia is theunreliability ofconventionalmodalitieslikeelectricstimulationand patient-reportedparaesthesia forconfirmingprecise nerve localization.

Demographic data:

Inourstudy,Table1 showsdemographicdata were comparable in both groups.Badranetal,(2020)[4] andJadonetal,(2015)[23] hadcomparable demographic data anddurationofsurgery.

Methodof Block:

WeusedUltrasound techniquefor giving Interscalene blockasby usingthistechnique, wecangivelesser volumeofdrugatperfectsite,so very lesschancesoflocalanaesthetictoxicity andtransientneurological complications.Drug isinjectedintothesheath solesschancesofnerve damage.

Jadonetal,2015,(17) haddone theirstudy of PNSguidedinterscalene blockforshoulder arthroscopicrepair forsurgicalanaesthesiaand analgesia.Badranetal,2020,haddonetheirstudyofUSGguidedinterscalene blockwithBupivacaineandperineuralDexamethasonealongwithgeneral anaesthesia for shoulder surgicalprocedures.

Drugfor Interscalene Block

Estimatedtimeofoursurgery wasapproximately 2-3hours, sowe have takenlonger actinglocalanaesthetic drug– PlainBupivacaine 0.5%**Volume ofDrug:**WehaveusedPlainBupivacaine0.5%15mlinourstudyofUSguidedInterscalene Block.Falcaoetal,(2012)[12]intheirstudyestimatedeffectivevolumeof Bupivacaine0.5%by usingthestep-up/step-downsequenceaccordingto theformulaeproposedbyDixon,focusingontheanalysisofthe minimum anaestheticvolumewitha50%probabilityofeffectivenerveblock.Intheir study 15mlof 0.5%bupivacainewithepinephrine(1:200000)was injected,withadirectviewoftheinjectionsite.Theinjectionwasgivenin two equalalliquotsof7.5ml:onebetweentheupperandmiddletrunk and one betweenthe middleandlower trunkof thebrachialplexus.

Adjuvant :

WehaveusedDexamethasone8mgperineurallyasadjuvantin GROUP A.

Davidetal,(2019)[10],intheirstudyobservedthati.v.dexamethasone hasadirecteffectonablockednerve,thereforetheconcentrationofsteroid reachingthatnerveshouldbeverymuchlessthanthatachievedbyplacing thelocalanaesthetic directly ontothe nerve.KeAn,NabilM.Elkassabany,JiabinLiuetal,(2015)[27]intheirstudy ofcomparisonof different dose ofDexamethasone 0.14mg/kgand 0.5 mg/kgcombinedwithBupivacaine for sciatic nerve block demonstrated that PerineuralDexamethasone prevent axonal degeneration and demyelinationandnosignificantcaspasedependentapoptosis processin themouse sciatic nerveamongallstudy

groupsintheirstudy period. Neurotoxicityofplainbupivacaineidentifiedviahistomorphologyand S-100expressionpatternswas nolongersignificantwith theco- administrationofpreservative-freedexamethasoneperineurally.Perineural DexamethasonepreventstheBupivacaineinducedreversibleneurotoxicity andshortterm"reboundhyperalgesia" after the resolutionofnerve block. In ourstudy,thereforewe have takenlowdoseDexamethasone as perineuraladjuvant.

Typeof surgery:
Inourstudy,Table2showsvariousupperarm andshoulder surgeriesconductedunder US guidedinterscaleneblock. Jadonetal,2015(17)and Badranetal(3)hadusedinterscaleneblock for variousupper armsurgeries.

Onsetof sensoryand motor block:
In ourstudy,inTable 3,we observedthatinGroupA (Bupivacaine0.5%+Dexamethasone)meanonsetofsensoryblockwas 3.866±1.33min whileinGroupB(Bupivacaine0.5%+NormalSaline)it was7.566±1.67min(p<0.0001). MeanonsetofmotorblockwasfasterinGroupA 7.933±1.25min comparedtoGroupB11.733±2.08min,whichisalsostatistically highly significant(p<0.0001).From thisitisclearthatGroupA– Dexamethasonegrouphadfasteronsetofsensoryandmotorblock than GroupBwithout anyadjuvant.

Ina study conductedby Daretal[9],who addeddexamethasoneto ropivacaineinbrachialplexusblockand observedthattheonsettimein dexamethasonegroupforsensory blockwas14.65+3.31minwhichwas significantlyshorter thanthe controlgroup(17.5+4.2min).

KhalidAliKhaleeletal[19],intheirstudyofbrachialplexusblock,the meantimefortheonsetof sensory blockwas7mininBupivacaine+ NormalSalineGroup and5 mininBupvacaine+DexamethasoneGroup. Theonsetofmotorblockwas17.53±1.70mininBupivacaine+Normal SalineGroupand14.63±2.79mininBupivacaine+DexamethasoneGroup.

InastudyofBrachialPlexusBlockconductedbyEl-Barade

Elshmaa[13],theyobservedthe onsettime formotor blockwithbupivacaineanddexamethasonetobe11.4±3.6minwhichiscomparabletoourstudy.

Jadonetal,(2015)[17]intheirstudyobservedthatDexamethasone whenmixedwithRopivacainehadnoeffectontheonsetof sensory and motor block.

Durationof sensoryand motor block:
Inourstudy,inTable6thedurationofsensoryblock waslongerinGroupA(904±113.88mins)compared toGroupB (305.33±63.17mins),
p<0.0001.DurationofmotorblockwaslongerinGroupA(Bupivacaine0.5%

+Dexamethasone)861minscomparedtoGroupB(Bupivacaine
0.5%+NormalSaline)264.33min.

(p<0.0001).In study of Vieiraetal,(2009)[48]Themediansensoryblockduration was1457versus833min(P<0.0001)andmotorblockdurationwas1374 versus 827 min (P< 0.0001) when compared with the control. Vasconcelosetal,(2020)[32]intheirstudyofinterscaleneblock,mean durationofsensory blockwas1440±0minutesinDexamethasone+ Levobupivacainewith vasoconstrictorGroupand 1267± 164minutesin NormalSaline + Levobupivacaine withvasoconstrictor Group.

KhalidAliKhaleeletal[19],intheirstudy ofbrachialplexusblock, themeandurationofsensory blockwas289.50±45.71mininGroupBS (Bupivacaine+Normalsalineand1160 ± 143.10mininGroupBD.This differencewashighlystatistically significantwithP<0.0001.Themean durationofmotorblockwas216.27±37.73mininGroupBSand870.87±101.14mininGroupBD.Thistoowasfoundtobehigh ly statistically significantwithP<0.0001.

Choietal[6]whoconductedameta-analysisof RCTsandincluded

801patientsofbrachialplexusblock. Theyobserved thatdexamethasoneprolongedtheanalgesicdurationforlong-actinglocalanestheticfrom730to1306min,whilemotorblock wasprolongedfrom

664to1102minwithoutanyobservedadverseevents.ParveenSetal,(2017)[23]intheirstudyofbrachialplexusblock, meandurationofsensory blockwas1085.23minutesin Dexamethasonegroupand322.37minutesin controlgroup.The meandurationofmotorblockwas510minutesinDexamethasone groupand352.33minutesincontrolgroup.

Durationof analgesia:
Inourstudy, inTable8itwasobservedthatthe durationof analgesia waslongerinDexamethasoneGroupA(1455.86±167.25mins)comparedtoGroupB(806.16±62.47mins).(p<0.0001).

K.C.Cummingsetal(2011)[7],intheirstudy ofinterscalene block observedthatdexamethasonesignificantly prolongedthedurationof analgesiaofbothropivacaineandbupivacaine.Meandurationofanalgesia inBupivacaine withDexamethasone groupwas1344minutesand BupivacainewithNormalSalinegroupwas888minutes.Thisstudy resultsare comparable toour study.Jadonet al,(2015)[23]intheirstudyofinterscaleneblock,meandurationof analgesiawas1103.72296.02minutes intheDexamethasone+ Ropivacaine group and551.54166.92minutesinthecontrolgroup.Rosenfeldetal,(2016)[38] intheirstudyofperineuralversus intravenousdexamethasoneasadjunctstolocalanaestheticsininterscalene block,it increases duration of analgesia .

Tandocetal,(2011)[24] intheirstudyofinterscaleneblock,mean duration ofanalgesiawas1408+/-158minutesinBupivacaine+ Dexamethasone groupand798+/-60minutesincontrol group. Thisstudy resultsare comparable toour study.Vieriaetal,(2010)[48] intheirstudyofinterscaleneblock,mean duration ofanalgesiawas 1457± 434minutesinBupivacaine+ Dexamethasonegroupand833±267minutesin controlgroup.Thisstudy resultsare comparable toour study.Desmetetal,(2013)[11]intheirstudyofinterscaleneblock,mean duration of analgesia was 1433 ± 619 minutes in Ropivacaine + Dexamethasonegroupand824±510incontrolgroup.Thisstudyresults are comparabletoourstudy.D.Hollandetal,(2018)[8]intheirstudyofeffectofDexamethasone routeand doseonthe durationofinterscaleneblock,meandurationof analgesia was1524minutes inBupivacaine + 4mgDexamethasone given perineurally, 1632minutesinBupivacaine+ 8mgDexamethasone given perineurally,1440minutesinBupivacaine(perineural) +4mg Dexamethasonegivenintravenously, 1488minutes inBupivacaine (perineural) +8mgDexamethasonegivenintravenously.

PerioperativeHaemodynamic Parameters:
Inour study, intraoperativeHaemodynamicparameterswerestable andcomparableinboththegroups.Itisevidentfrom Table4,Table5.PostoperativeHaemodynamicparameterswerestable andcomparableinboththegroups.Itisevidentfrom Table4,&5.Thismay beduetosuccessfulblockandadequate intraoperativeanaesthesiaandanalgesia.Also,postoperatively VASwas managed4byrescue analgesic requests.Badranetal,2020[3], intheir study ofInterscalene block,asregards hemodynamics,theywerestableallthroughsurgeryandpostoperativelyin thetwogroups.TheynoticedanincreaseintheHRandMAPintheControlgroup higher thanintheDexamethasone groupat 12hand24h postoperatively:

TotalAnalgesic requestsin24hours:
Inour study,intable9itwasobserved thattotal numberofanalgesicrequestsinGroupAwithDexamethasonewas1.2

0.4068andinGroupBwas2.370.4901.(p<0.0001).Thus,needforpostoperativeanalgesiain GroupAwithadjuvantDexamethasoneisveryless comparedtoGroupB withoutadjuvant.

Zorilla Vecca etal(26) have proved that perineurally given dexamethasone is better adjuvant then IV Dexamethasone .

Tandoc etal(24) showed that prolonged Analgesia in Dexamethasone as adjuvant for US guided Interscalene Block.

Complications:

AsevidentfromTable 10, nocomplications oradverseeffects were notedinGroupA.2patients(6.67%)inGroupBhadpostoperativenausea vomitingassideeffects.NoPONVwasobservedinGroupAthiscouldbe attributedtotheantiemeticpropertiesofDexamethasone. Nopatients neededany additionalairway assistanceoroxygenation.Therewereno delayedneurologicalcomplicationsobservedinany patientofeachgroup inour study.Badranetal,(2020)[4]intheirstudyofinterscaleneblock,therewere nodexamethasone-specificadverseeffects;however,they noticedthat postoperativenauseaandvomitingweremorecommonwithintheControl group(7outof 23 patients), whencomparedto theDexamethasone group (1outof22patients), whichcanbeattributedtotheantiemeticeffectof dexamethasone.Asregardstheinterscalene block sideeffects,they had used30mlof0.5%Bupivacainealongwith dexamethasone 8mg perineurallyunder US guided block. Horner syndrome was the most commonandwasobserved in5 patientsoutof23(21.7%) intheControl groupand4patients outof22(18.2%) intheDexamethasonegroup. Phrenicnerveaffectionintheformofdiaphragmaticparesiswasobserved in2 patientsoutof 23(8.7%)intheControlgroupandin3 patientsout of 22patients(13.6%) intheDexamethasonegroup,whichwasipsilateral withoutbreathingdifficulty. Therewere nopneumothoraxcasesfound.Jadonetal,2015[17]alsoused30mlofRopivacaine0.5%and observedHorner syndrome in11/50(20.5%) inthe dexamethasone- ropivacaine groupand15/50(23.5%) intheropivacaine- only group,but diaphragmaticparesiswasobservedin10 outof 50 patients(20%)inthe dexamethasonegroupandin8outof50patients(16%)intheropivacaine- onlygroup.Twopatients(2/50)indexamethasone–ropivacainegroupand1(1/50)inropivacaine group hadexternaljugular vein puncture,which wasmanagedwithexternalcompressionanddid notrequireany intervention.

K.C.Cummingsetal,(2011)[7]intheirstudy ofinterscaleneblock, no adverse events weredetectedin108patientsgivendexamethasone, the

95%CIforneurotoxicitywas 0–3%.Desmetetal,(2013)[11]observed20.5%HornerSyndromeinpatients whoreceivedropivacaineonly and23.5% patientswhoreceived ropivacaine anddexamethasone mixture ininterscalene block.

KhanAlamNooretal,(2016)[20]intheirstudyofinterscaleneblock, onepatientsufferedfrom ipsilateralwristdropinvolvingradialnerveand uptosomeextentthat wasdueto surgicalcompressionoftheterminalnervesofthe brachialplexusandnot due toblock.

Conclusion:-

Innutshell,itcanbeconcludedthat,perineuraldexamethasone8mgadded to 0.5%PlainBupivacaineinUSguided interscaleneblockforelective upperarm surgeries,providesfasteronset ofsensoryandmotorblockage, prolongsthedurationofsensoryandmotorblockage,durationofanalgesia anddecreasespostoperativeanalgesicrequestswithoutany adverse reactions.

References:-

1)AbrahamsMS,AzizMF,FuRF,HornJL.Ultrasoundguidance comparedwithelectrical neurostimulationfor peripheralnerve block:A systematic reviewandmeta-analysis ofrandomized controlledtrials.Br JAnaesth. 2009;102:408–17.[PubMed]

2)AlbrechtE,KernC,KirkhamKR(2015)Asystematicreviewand meta-analysis of perineural dexamethasone for peripheral nerve blocks. Anaesthesia.70(1):71–83

3) Badran,M.A.e.F.M.,Kamaly,A.M.,AbdelHamid,H.M. etal.Dexamethasoneasa bupivacaineadjuvantfor ultrasound-guided interscalenebrachial plexus block:a prospectiverandomizedstudy. Ain-ShamsJ Anesthesiol12, 61(2020).https://doi.org/10.1186/s42077-020-00113-7

4)Beyazit Zencirc : Comparision of nerve stimulator and ultrasonography asthe techniquesappliedforbrachialplexus anesthesia.InternationalArchivesofMedicine,December20114:4.Pg1-4
5)BrianD.Sites,VincentW.Chan,JosephM.Neal,RobertWeller, ThomasGrau,Zbigniew J.Koscielniak-Nielsen andGiorgio Ivani, The AmericanSociety ofRegionalAnesthesiaandPainMedicine andtheEuropeanSocietyofRegional AnaesthesiaandPainTherapy JointCommitteeRecommendationsforEducation andTrainingin Ultrasound-GuidedRegionalAnesthesia, RegionalAnesthesia and PainMedicine,Volume35,Number2,1,March-April2010:74-80
6)Choi,R.Rodseth,C.McCartney.Effectsofdexamethasoneasa localanaestheticadjuvantforbrachialplexusblock:asystematic reviewandmeta-analysisofrandomizedtrials.BrJAnaesth,112 (2014), pp. 427-439
7)CummingsKCIII,NapierkowskiDE,Parra-SanchezI,KurzA, DaltonJE,BremsJJ,Sessler DI (2011) Effectof dexamethasoneon the durationofinterscalenenerveblockswithropivacaine or bupivacaine.BritJAnaesthesia. 107(3):446–453
8)D.Holland,R.Amadeo,S.Wolfe,etal.Effectofdexamethasone doseandroute onthe durationof interscalene brachialplexusblock for outpatientarthroscopic shouldersurgery:arandomized controlledtrial.CanJ Anaesth,65(2018),pp.34-45
9)DarF,NajarM,JanN.Effectofadditionofdexamethasoneto ropivacaine insupraclavicular brachialplexusblock.IndianJournal of Pain.2013;27(3):165-9.
10)David Hewson, Nigel Bedforth, Colin McCartney, Jonathan Hardmanetal,(2019),Dexamethasoneandperipheralnerveblocks: backtobasic(science).BritishJournalofAnaesthesia,122(4):411e412(2019)
11)Desmet, H. Braems, M. Reynvoet, S. Plasschaert, J. Van Cauwelaert, H. Pottel, S. Carlier, C. MissantandM. Vande Velde etal.I.V.andperineuraldexamethasoneareequivalentinincreasing the analgesic duration ofa single-shot interscaleneblockwith ropivacaine for shoulder surgery: a prospective, randomized,placebo-controlledstudy.BritishJournalofAnaesthesia111(3): 445–52(2013)
12) DixonWJ.Theup-and-downmethodforsmallsamples.JAmStat Assoc 1965;60:967–78
13)El-Baradey GF, Elshmaa NS. The efficacy of adding dexamethasone, midazolam, orepinephrineto0.5% bupivacainein supraclavicularbrachialplexusblock.Saudijournalofanaesthesia. 2014;8(Suppl1):S78-83.
14)GuptaA,KaurK,SharmaS,GoyalS,AroraS,Muthy RS.Clinical aspectofpost-operativepainmanagement&itsassessment.Journal of advanced pharmaceutical technology &research. 2010 Apr;1(2):97.
15) Harold Ellis, S. Feldman, Harrop Griffith : Anatomy forAnaesthetist;Eightedition2004:pageno.153-158
16)https://www.nysora.com/techniques/upper- extremity/intescalene/ultrasound-guided-interscalene-brachial-plexus-block/
17)JadonA,DixitS,KediaSK,ChakrabortyS,AgrawalA,SinhaN (2015) Interscalene brachial plexus blockfor shoulder arthroscopic surgery:prospectiverandomisedcontrolledstudyofeffectsof0.5% ropivacaineand 0.5% ropivacainewith dexamethasone.Indian J Anaesthesia59(3):171
18)Ke An, Nabil M. Elkassabany, Jiabin Liu et al, (2015) Dexamethasone asAdjuvanttoBupivacaine Prolongsthe Duration of Thermal Antinociception and Prevents Bupivacaine-Induced ReboundHyperalgesiaviaRegionalMechanisminaMouseSciatic Nerve Block Model. April 9, 2015. https://doi.org/
10.1371/journal.pone.0123459
19)KhalidAliKhaleelMBChB,DAFICMS,ZaidAl-AttarMBChB, PhD,etal.TheEfficacy ofBupivacainevsBupivacainewith Dexamethasonefor SupraclavicularBrachialPlexusBlockin PatientsUndergoingUpper-LimbSurgeries. SchAcadJPharm, Jan,2020;9(1):46-50
20)KhanAlamNoor,ZiaMuhammadAshraf,KhanRizwanAhmad, ArshadMaria, AzizNasrullahKhan, KhalidAifaaetal. Effectof LowversusHighDoseDexamethasonewithBupivacaine on DurationofInterscaleneBlock.PJMHSVol.14,NO.2,APR–JUN 2020
21) L.F.R.Falcao,M.V.Perez,I.deCastro,A.M.Yamashita,M.A. Tardelli,J.L.G.Amaraletal.Minimum effectivevolumeof0.5% bupivacaine withepinephrine in ultrasound-guidedinterscalene brachialplexusblock.BritishJournalofAnaesthesia110(3):450–5(2013)
22)LuzMaríaLopera-Velásquez,CarlosRestrepo-Garcés.Ultrasound andnervestimulation-guidedaxillary block_revcolombanestesiol 2016;44(1):30–35
23)ParveenS,JanM,TajA,BhatAA.Effectofdexamethasoneasan adjuvantwith bupivacainein ultrasoundguidedsingle shot supraclavicularbrachialplexusblockinupperextremitysurgeries-aprospectiverandomizedstudy.IntJResMedSci2017;5:2139-43.

24)TandocMN,FanL,KolesnikovS,KruglovA,NaderND(2011) Adjuvantdexamethasone withbupivacaineprolongsthe durationof interscaleneblock:aprospectiverandomizedtrial.JAnesthesia.
25(5):704–709
25)VinendraNathVaid,AparnaShuklaetal.InterScaleneBlock: Revisitingoldtechnique.AnesthEssaysRes.2018Apr-Jun;12(2):344–348. doi:10.4103/aer.AER_231_17
26)WhaleyL,WongD.NursingCareofInfantsandChildren,3rd edition,Mosby,1987
27)Zorrilla-Vaca, Andres, Li, Jinlei et al. Dexamethasone injected perineurally ismoreeffectivethanadministeredintravenously for peripheralnerveblocks.TheClinicalJournal ofPain,Volume34, Number 3, March2018,pp.276-284(9)
28) Sites, Brian D.; Chan, Vincent W.; Neal, Joseph M.; Weller, Robert; Grau, Thomas MD; Koscielniak-Nielsen, Zbigniew J.; Ivani, Giorgio. The American Society of Regional Anesthesia and Pain Medicine and the European Society of Regional Anaesthesia and Pain Therapy Joint Committee Recommendations for Education and Training in Ultrasound- Guided Regional Anesthesia, Regional Anesthesia and Pain Medicine, Volume 34, issue 1, January-February 2009:40-46.