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RESEARCH ARTICLE

BULBO-MEDULLARYEPENDYMOMAINANADULT:CASEREPORT

Tarik Chekrine[1], Meriem Ait Alla[1], Mouna Bourhafour[1], Zineb Bouchbika[1], Nadia Benchakroun[1], Hassan Jouhadi[1], Nezha Tawfiq[1], Mehdi Karkouri[2], Abdelhakim Lakhdar[3] and Souha Sahraoui[1]

1. RadiationOncology. Department,MohamedVICenterforCancerTreatment,UHCIbnRochd,FacultyofMedicineandPharmacy,HassanII University,Casablanca, Morocco.
2. LaboratoryofAnatomopathology,UHCIbnRochd,FacultyofMedicineandPharmacy,HassanIIUniversity,Casablanca, Morocco.
3. NeurosurgeryDepartment,UHC IbnRochd,FacultyofMedicineandPharmacy,Casablanca,Morocco.

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Abstract

Spinal ependymoma, the most common intramedullary tumour in adults, is generally located intradurally and intramedullarily. The presence of this tumor in the bulbo-medullary region is rarely documented in the medical literature.We present the case of a 33-year-old man with persistent torticollis and severe neck pain. Spinal cord magnetic resonance imaging revealed a lesion in the bulbo-medullary region. Subtotal resection of this lesion was performed, and anatomopathological and immunohistochemical analysis confirmed the diagnosis of ependymoma. Following surgery, the patient underwent post-operative radiotherapy.The standard therapeutic management of ependymoma is total tumor resection. However, the role of post-operative radiotherapy remains to be determined, although it is recommended in cases of subtotal resection.

Introduction:-

Ependymomas are malignantneuroepithelialtumoursthatoccur in children and adults,and can developalong theneuraxis[1]. It has recently been acknowledgedthatthesetumoursoriginatefrom radial glial stem cells[2]. Theyconstitute 3-6% of all central nervous system tumours and are the mostcommonintramedullarytumour of the adultspinalcord,representingapproximately60%ofallcases[3]. Theoccurrenceofthesetumourinthebulbo-medullaryregionisrarelydescribedintheliterature, thus, wepresentanovelobservationina33-year-oldadult.

Observation:-

A 33-year-old man with no previoushistory of the condition had been enduringsevere neckpain and torticollissince April 2020. No motor or sensorydisorders of the cranial nerves wereobserved. A standard X-ray of thecervical spinedid not indicateanyspecificlesions. The patient underwent a rehabilitationregimenconsisting of physiotherapy sessionsand muscle strengthening techniques. However, when the torticollis and neck pain persisted,a spinal magneticresonanceimagingwasperformed. This revealed a bulbo-medullary tissue lesionwithcystic areas 47 mm height and 25 mm in width, presentingwithheterogeneousisosignal in T1 sequence and heterogeneous hypersignal in T2 sequence (Figure 1a;1b). A subtotalresectionofthetumourwasexecutedviaaposteriorapproachtotheoccipitatC3

Corresponding Author: -Tarik Chekrine
Address**:-**RadiationOncology. Department,MohamedVICenterforCancerTreatment,UHCIbnRochd,FacultyofMedicineandPharmacy,HassanIIUniversity,Casablanca, Morocco.

withoutanyintra-orpost-operativecomplications. The histopathologicalstudyshowedtumourproliferation in the form of perivascularrosettesandpalisadingarrangementsofcolumnarcells,exhibiting an ependymalphenotypewithoutsignificantatypiaor necrosisorendotheliocapillaryhyperplasiasuggestiveofependymoma.Additionalimmunohistochemistryconfirmed the diagnosis of WHO grade IIclassicalependymoma (Figure 2a). The tumourcellstested positive forGFAP (Figure 2b) but did not express Olig 2(Figure 2c). The patient underwent adjuvant radiotherapy on the residueltumour at a dose of 50.4 Gy inconventional mode (Figure 3). Clinical and radiological follow-updemonstrated a substantialimprovementinsymptoms andnoprogressionof the tumourafter18months.

Discussion:-

Spinal ependymomais the mostcommonintramedullarytumour in adults, making upover60% of allsuchlesions[3]. They can manifestin anyregion of the spinal cord, butare the mostfrequentlyfound in the cervical and cervicothoracicsegments[4]. Bulbo-medullary localisation isparticulary rare and of specificinterestinthiscase.

Ependymomaswere long presumed to derivefrom the ependymalcellslining the central canal of the spinal cord.However,morerecentresearchsuggeststhattheyactuallyoriginatefromradialglialprogenitororstemcells[2].

The 2021 revision of the WHO classification of central nervous system tumoursintroduced a significant change byclassifyingependymomasintoten types based on theiranatomical location (supratentorial, infratentorialandspinal)andmolecularcharacteristics(ZFTAfusionorYAP1fusionforsupratentorial,andposteriorfossaA"PFA"typeorposteriorfossaB"PFB"typeforinfratentorial)[5].

However, spinal ependymomas comprise four distinct types: spinal ependymoma (SP-EPN), spinal ependymomawithMYCNamplification (SP-MYCN),myxopapillaryependymoma(MPE)andsubependymoma(SE).

TheSP-EPN and SP-MYCN types necessitate a spinal location for diagnosis, whereas MPE and SE can alsooccur in otheranatomicalregions[5]. The molecular classification of ependymomasisbased on novel diagnostic technologies, such as DNA methylomeprofilingandDNAsequencing[4].

Spinalependymomasarealsolinkedwithneurofibromatosistype2, andsporadiccasesexhibitanincreasedfrequencyofNF2genemutation[6].

Thepeakincidenceofspinalependymomasoccursinthefourthdecadeoflife,witha medianageofpresentationof41years[5]. Men aremorefrequentlyaffectedthanwomen[7]. In thiscase,thepatientwas a 33-year-oldadult.

Due to their slow growth and tendency to compressratherthaninfiltrate the surrounding tissue, spinal ependymomasoftenpresentwithinsidiousclinicalsymptoms. Consequently, diagnosisisoften made up to 3 yearsafter the onset ofsymptoms[8]. Symptoms are usuallyattributable to compression of the brain stem or upper cervical cord. In the caseofthepatientpresentedhere, hehadbeencomplainingofneckpainforoverayear.

Pathologicalexaminationrevealsuniform, moderatelyhyperchromaticnuclei and perivascularpseudorosettes, whichclassicfeaturesofependymomas[4].

On immunohistochemistry, tumourcellscharacteristically express GFAP, S100 and vimentin and show focalintracytoplasmic dot or ring EMA expression. Contrary to spinal astrocytomas, spinal ependymomas are markedlynegative forOLIG2. Additionally, they do not express SOX10, a featurepresent in schwannomas, pilocyticastrocytomas andmostdiffusegliomas[2].

The majority of spinal ependymomas are grade 2 according to the WHO classification, with grade 3 tumoursbeingrare [2].

In a smallsubgroup of patients, MYCN amplification has been identified[4]. Thesetumours are high-grade andaggressive, buthavenotyetbeenofficiallygradedin the5thedition(2021)oftheWHOclassificationoftumoursofthecentralnervoussystem[2].

Radiologically, magneticresonanceimaging (MRI) is the examination of choice for investigatingintramedullarytumours. Spinal ependymomasgenerallypresentwith a heterogeneous signal, withlowintensity in T1 and highintensity in T2.

Heterogeneous gadolinium enhancementisoftenseen, with a clearboundary at the periphery ofthe tumour. Spinal ependymomas tend to belocated more centrally in the spinal cordthanastrocytomas, and themaindifferentialdiagnosistoconsiderisastrocytoma.In about20%ofcases,haemorrhagehasoccurred,formingalow-intensityT2bulge, usuallyattheperipheryofthetumour[9].

Complete tumourresection (GTR) is the primarytherapeuticapproach, offering a betterprognosis[10]. However, It is not achievableinaroundaquarterofcases[11]. GTRshouldbeconsideredatanearlystageofthedisease,asfunctionaloutcomeis linked to smalltumour size and good neurologicalstatus at the time of surgery[12]. Typically, aclearsurgicalinterfaceisusuallypresentbetweenthetumourandthespinalcordtissue.

Theroleofpostoperativeadjuvantradiotherapyremainsunclear,althoughitisfavouredincasesofsubtotalresection(STR).Adjuvantradiotherapyprolongsprogression-freesurvivalandrecurrence-freeintervalwhenthe resectionisincomplete.

In a review of 348 patients withmedullaryependymomaswhounderwentsurgery, GTR wasachievedin 77% and STR in 23% of patients. Adjuvant radiotherapywasadministred to 58.8% of patients with STRand 3.7% of patients after GTR. PFS wassignificantlyprolonged by adjuvant radiotherapyfollowing STR ($p<0.001$)[13].

The prognosis for spinal ependymomasisgenerallybetterthan for cranialependymomas. Total resectionis themostsignificantprognostic factor for spinal ependymomas. Recurrence rates can range from a few months to a fewyears[14]. Spinal ependymomaswith MYCN amplification are considered to beaggressivetumourswith a poorprognosis,withfrequentearlydisseminationthroughout the central nervous systemand recurrencedespiteresection[5]. StrategiestoinhibitMYCNareunderinvestigation,includingvaccination[15]. Othertypesofspinaltumourhaveamorefavourableoutcome[5].

Recurrences are not necessarilyaccompanied by neurologicaldeficits. Therfore, MRI monitoring can detectrecurrences in asymptotmatic patients to propose secondarytreatments, includingsurgery or radiotherapy,resultinginbetter progression-freesurvivalat3years. However,theimpactonoverallsurvivalremainslimited[16].

Figures:

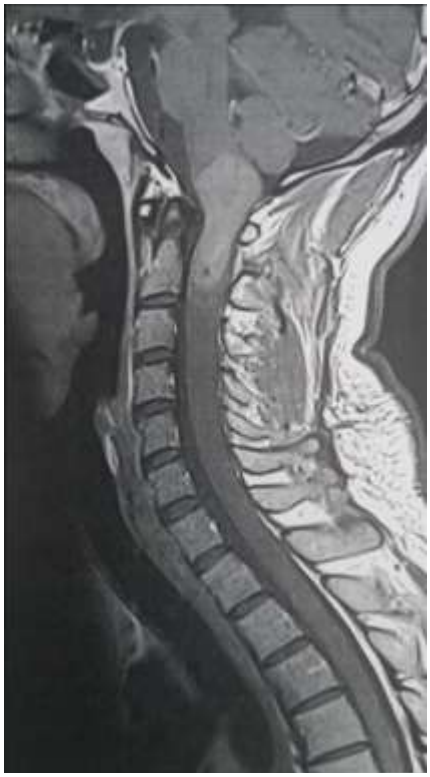

Figure 1a:- Preoperative Spinal MRI showing the bulbomedullarylesion in sagittal T1 isosignal.

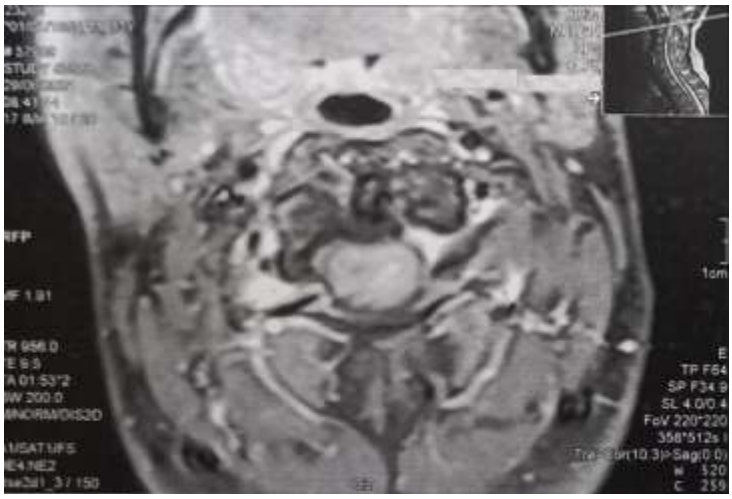

Figure 1b:- Preoperative Spinal MRI showingbulbomedullarylesion in axial T2 hypersignal.

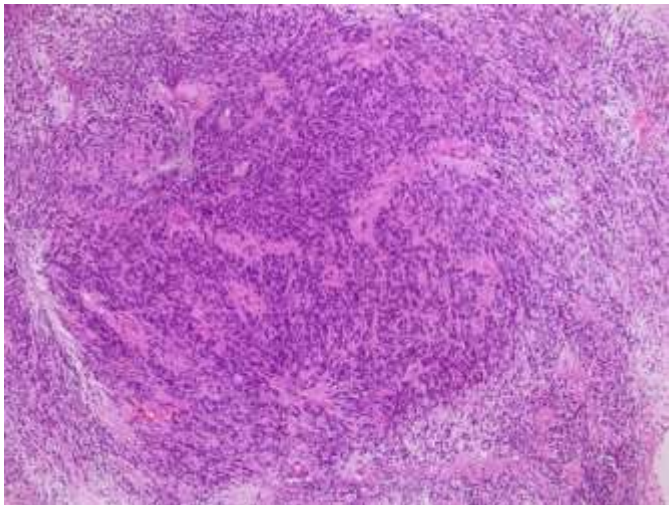

Figure 2a:- Typicalperivascularpseudorosettes (Hematoxylin and eosin, ×20.).

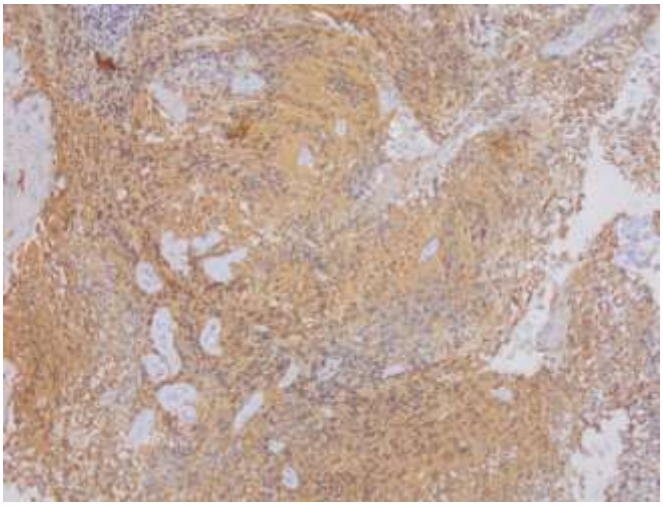

Figure 2b:- Glial fibrillaryacidicprotein (GFAP) highlights cellprocesses in perivascularpseudorosettes.

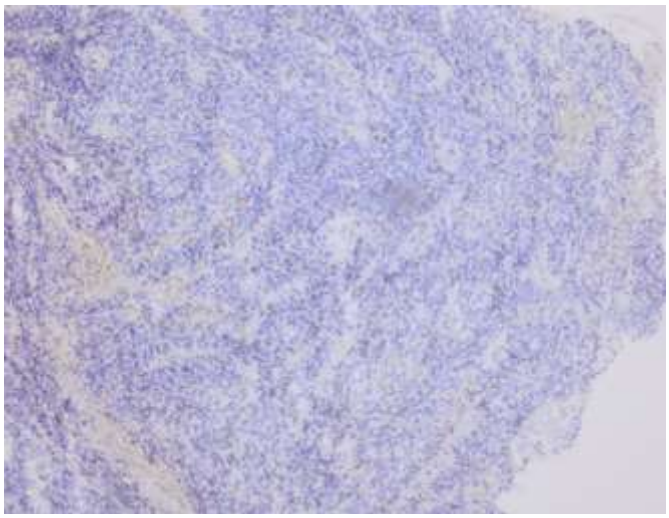

Figure 2c: Oligodendrocyte lineage transcription factor 2 (OLIG2) not expressed by tumor cells.

Conclusion:-

Bulbo-medullaryependymomas are rare. Despitethesebeingbenign, slow-growing, indolent tumourswithfavourable long-termsurvival, itis essential to achievecompleteresectionwhilepreserving vital functions. Theroleofpostoperativeradiotherapyremainsundefined,althoughitisrecommendedwhenresectionissubtotal.

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