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Title:

Comparison of Hippocampal Sulcus Width and Cavities Between Patients with Alzheimer Disease and Nondemented Elderly Subjects

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Abstract:

The most common cause of dementia is Alzheimer disease(AD). Neuropathologic changes underlying AD first occur in the medial temporal lobe.Therefore, structural neuroimaging in AD is focused on detection of medial temporal lobe atrophy (MTA), particularly of the hippocampus, parahippocampal gyrus and amygdale.Enlarged CSF spaces in the hippocampus have been noted in MR imaging studies of the medial temporal lobe in aging and AD. Because brain atrophy results in enlargement of the CSF spaces, either hippocampal sulcus(HS) enlargement or an increase in the number or size of HC could be associated with MTA occurring in Alzheimer disease.

In this study we cmpare the Hippocampal Sulcus Width and Cavities Between Patients with Alzheimer Disease and Nondemented Elderly Subjects.

Methods: Methods:

Subjects in patient group : demented patients with diagnosis of AD are refered by their neurologist for basic MR imaging before initiating antidementia therapy.They should have Mini-Mental State Examination (MMSE) (possible range of scores, 0–30)score ≤20 and are classified as having 20≥MMSE scores ≥18 or MMSE scores<18.Subjects in control group are nondemented elderly individuals referring by the same neurologist for evaluation by MRI for complains other than dementia (like headache,vertigo,dizziness,..) with normal MMSE.

MR imaging examinations are performed by using a superconductive magnet operating at 1.5T system for both groups.For each subject of each group, table of data including MTA visual score,presence(+,-),number and size of HCs,and HS width for each hemisphere is performed by both observers.

The relation between prevalence ,number,size of HCs and HS width with MTA score are examined by Independent T test and X 2 test.To assess interobserver agreement,we use kappa coefficient for numerical variables.

Results:

Thirthy six patients with Alzheimer disease and nondemented elderly control subjects were studied. The presence of hippocampal cavity on left side was higher in patients with Alzheimer disease than nondemented elderly control subjects by two observers($P<0.05$).

Mann-Whitney test indicated that higher grades of MTA was presented in case group.

There was significant correlation between MTA and HS($P=0.003$ $r=0.00323$).There wasn't significant correlation between MTA and HCS,but it had a trend to be significant($P=0.08$ $r=0.00314$).

There wasn't significant correlation between MTA and HSP and HCN.

Interobserver agreement for the presence of hippocampal sulcus on right and left side was 91.7% ($P<0.05$) and 88.9% ($P<0.05$),respectively. The interobserver agreement was significant for studied indicies except;HCS-L1 & HCS-L2, HS-R1 & HS-R2 and HS-L1 & HS-L2.

There wasn't any correlation between studied variables and age in control group.In case group, there wasn't any correlation between HCS and age of studied subjects.There was significant relationship between age and HS($P=0.04$,$r=-0.029$ for right side and $P=0.06$,$r=-0.025$ for left side),HCN($P=0.004$,$r=0.004$ for right side and $p=0.03$,$r=0.003$ for left side) and MTR($P=0.02$,$r=0.034$ for right side and $P=0.005$,$r=0.004$ for left side.

Mean age of patients with and without hippocapal cavity was 65.9 +/-8.07 and 59.8+/-7.08 respectively,($P<0.05$).

Conclusion:

Taken together, the findings in this report represent that enlargement of the hippocampal sulcus, is associated with MTA in patients with Alzheimer disease and may serve as a measure to rate MTA severity. By contrast, hippocampal cavities were not found to be significantly associated with MTA or Alzheimer disease and do not seem to have pathologic value. Moreover these MRI measures may also be useful in identifying individuals at particularly high risk for progression, and could readily be employed for selecting subjects for clinical trials in MCI, or for guiding for treatment decisions, when improved medications become available. The use of neuroimaging for the early detection of the effects of AD on the brain has been successful even in the earlier stages of disease when clinical symptoms are not fully expressed and the regional brain damage may be limited. Additional work is required with a larger sample size and the use of MR imaging sequences acquired at higher field strengths (enabling more spatial resolution) would be important to confirm our findings. More work is also needed to validate these results in population-based random cohorts of elderly individuals and to assess the specificity of neuroimaging markers for AD as opposed to other types of dementing disorders. Such information will contribute to improved selection of study subjects in clinical trials and for improved monitoring of treatment effects.

Key words: Magnetic Resonance Imaging, Alzheimer Disease, Hippocampal Sulcus, Hippocampal Cavities

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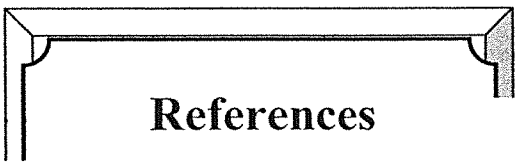

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مقا یسه عرض شیار هیپوکامپوس و حفره های آن در بیماران مبتلا به آلزایمر و سالمندان غیر مبتلا به دما نس

شایعترین علت دمانس بیماری آلزایمر می باشد.اولین تغییرات نوروپاتوژنیک در قسمت داخلی لوب تمپورال رخ می دهد.لذا مطالعات رادیولوژیک در این زمینه بر اساس وجودیافته هایی مبنی بر آتروفی قسمت داخلی لوب تمپورال خصوصا هیپوکامپ، شیار پارا هیپوکامپ و آمیگدال می باشد. در مطالعاتی که برروی قسمت داخلی لوب تمپورال در بیماران مبتلا به آلزایمر و افراد سالمند انجام شده است ، افزایش فضای CSF در هیپوکامپ گزارش شده است.با توجه به اینکه اتروف مغز باعث افزایش فضای CSF و نیز بزرگی شیار هیپوکامپوس و یا افزایش تعداد یا اندازه حفره می گردد ،لذا این یافته ها با وقوع آتروفی قسمت داخلی لوب تمپورال در بیماران مبتلا به آلزایمر مرتبط می باشد.در این مطالعه عرض شیار هیپوکامپوس و حفره های آن در بیماران مبتلا به آلزایمر و سالمندان غیر مبتلا به دما نس مقایسه گردید.

مواد و روشها:

در این مطالعه افراد گروه مورد ازبین مبتلایان به آلزایمر(با MMSE < ۲۵) که قبل از شروع درمان برای بررسی رادیولوژیک با MRI ارجاع شره بودند ،انتخاب شدند.گروه کنترل از بین بیماران سالمند غیر مبتلا به دما نس (با MMSE نرمال) که جهتبررسی رادیولوژیک با MRI برای بررسی سایر اختلالات بجز دمانس مراجعه نموده بودند ، انتخاب شدند. بررسی رادیولوژیک با MRI در هر دو گروه توسط دو مشاهده گرانجام گرفت واطلاعات مربوط به درجه آتروفی قسمت داخلی لوب تمپورال،وجود ،اندازه و تعداد شیار هیپوکامپوس و حفره های آن در هر گروه بررسی و قبت گردید.ارتباط بین یافته های فوق با آتروفی قسمت داخلی لوب تمپورال و نیز ضریب همبستگی بین دو مشاهده گر با آزمونهای T ، 2 X و ضریب همبستگی کاپا بررسی گردید.

نتایج:

در این مطالعه ۳۶ نفر در هر گروه مورد مطالعه قرار گرفتند.وجود شیار هیپوکامپوس در گروه بیماران بیشتر از گروه کنترل بود (P<0.05) .درجات بالاتری از آتروفی قسمت داخلی لوب تمپورال در گروه بیماران مشاهده گردید. بین آتروفی قسمت داخلی لوب تمپورال و وجود شیار هیپوکامپوس رابطه معنی داری وجود داشت (P=0.003 r=0.00323) ولی با تعداد ان رابطه و وجود حفره رابطه معنی داری وجود نداشت و با اندازه ان گر چه رابطه معنی داری وجود نداشت ولی تمایل به معنی دار شدن داشت (P=0.08 r=0.00314) . ضریب همبستگی بین دو مشاهده گر برای وجود شیار هیپوکامپوس در سمت راست و چپ به ترتیب ۹۱,۷% و ۸۸,۹% بود (P<0.05) و در سایر موارد نیز معنی دار بود بجز اندازه شیار و ؟ .رابطه ای بین متغیر های مورد مطالعه و سن در گروه کنترل وجود نداشت و در گروه مورد نیز بجز اندازه شیار در سایر موارد با سن رابطه معنی داری وجود داشت (P<0.05).میانگین سن بیماران با و بدون حفره هیپوکامپوس به ترتیب 8.07-/+ 65.9 و 7.08-/+59.8 بود (P<0.05).

نتیجه گیری:

با توجه به یافته های حاصل بین شیار هیپوکامپوس و آتروفی قسمت داخلی لوب تمپورال و نتیجتا بیماری آلزایمر رابطه معنی داری وجود داشت در حالی که این رابطه در مورد حفره هیپوکامپوس وجود نداشت.علاوه بر آن به نظر می رسد که MRI یک روش رادیولوژیک مناسب در بررسی اولیه بیماران و افراد در معرض خطر این بیماری باشد و استفاده از روش رادیولوژیک در مراحل اولیه بیماری که علایم بالینی کمتری وجود دارد ،در تشخیص بیماری مناسب می باشد.با این وجود مطالعات بیشتری با حجم نمونه بیشتر و روشهای پیشرفته تر MRI و در سطح وسیع تری از جامعه توصیه می گردد.

کلمات کلیدی: مگنتیک رزونانس ، آلزایمر ، شیار هیپوکامپوس، حفره هیپوکامپوس