ポータブルCTにより脳卒中後の生存の可能性が高くなる

救急治療室でのポータブルCTスキャンにより虚血性脳卒中の診断および治療が速まる

Portable CT scanner in the emergency room speeds diagnosis and treatment of ischemic stroke

救急治療室において ポータブル8スライスコンピュータ断層撮影（CT）が使用可能となることにより、虚血性脳卒中の診断および治療までの時間が有意に短縮できるとRadiological Society of North America（RSNA）学会で発表された。研究者らは、ポータブルCTスキャン使用前に脳卒中の徴候で来院した患者127人とポータブルCTスキャンが使用可能になった後に同様の症状で来院した患者281人の予後を比較した。ポータブルCTスキャンが使用可能となる前は、患者はCTスキャンのために他の建物に移動しなくてはならなかった。救急治療室でCTスキャンが使用可能になったことで、検査オーダーから検査までの時間が34.55分（±2.2分）から15.88分（±2.4分）へと54%短縮した（p<0.001）。シミュレーションモデルに基づき研究者らは、この改善により発症から3時間以内に血栓溶解療法を受けられる患者の数が86%増加するであろうと推測している。

Full Text

New research has found that the availability of a portable eight-slice computed tomography (CT) scanner can significantly reduce the time to diagnosis of ischemic stroke for patients presenting to the emergency room. Results of the study, conducted at North Shore Medical Center (NSMC)-Salem Hospital in Salem, Mass., were presented at the annual meeting of the Radiological Society of North America (RSNA).

"The hospital's acquisition of a portable CT scanner facilitated more rapid assessment of acute stroke patients and is anticipated to increase the number of patients to whom thrombolytic therapy can be administered," said the study's lead author, David B. Weinreb, M.D., now a resident physician in the Department of Radiology at Hospital of Saint Raphael in New Haven, Conn.

Ischemic strokes can be treated with thrombolytic therapy to dissolve the blockage. However, the window of opportunity to safely administer the medication is generally considered to be just three hours.

"tPA is usually the only shot we have at clot-induced ischemic strokes," Dr. Weinreb said. "But it needs to be administered in a closely monitored situation, because the drug can have extremely adverse effects in those patients whose strokes are instead due to bleeds." Before a patient receives tPA, a head CT must be performed to ensure there is no bleeding in the brain. The National Institute of Neurological Disorders and Stroke recommends that patients who arrive in the emergency room (ER) with signs of acute stroke undergo CT imaging within 25 minutes.

For the study, Dr. Weinreb and colleagues began using a portable CT scanner to assess stroke patients in the emergency room (ER) of NSMC-Salem Hospital. During the month prior to the acquisition of the portable scanner and for a four-month period following its installation, researchers measured how much time elapsed between a physician order for a head CT and performance of the scan.

The availability of the CT scanner in the hospital's emergency room reduced the time between the order and exam from 34.55 minutes (±2.2 minutes) to 15.88 minutes (±2.4 minutes), a reduction of 54 percent (p<0.001). Based on simulation modeling, the researchers estimated that this improvement would increase the number of stroke patients able to be treated with thrombolytic therapy within the three-hour window by 86 percent.

According to Dr. Weinreb, most stroke patients are taken to relatively small community hospitals where access to CT scanning may be limited. When a CT scanner is available, it is not always in proximity to the ER, making transportation of critically ill patients to the radiology department both difficult and time-consuming.

"A portable eight-slice CT can be easily added and used to accurately identify a head bleed in a stroke or trauma patient," Dr. Weinreb said. "This new technology is able to solve a very important problem for a community hospital, where the majority of stroke victims are being treated."

Co-author is James E. Stahl, M.D.

"For patients with major depression and other stress-related disorders, traumatic memories are a source of anxiety," said Nivedita Agarwal, M.D., radiology resident at the University of Udine in Italy, where the study is being conducted, and research fellow at the Brain Imaging Center of McLean Hospital, Department of Psychiatry at Harvard Medical School in Boston. "Because traumatic memories are not adequately suppressed by the brain, they continue to interfere with the patient's life."

Dr. Agarwal and colleagues used brain fMRI to explore alterations in the neural circuitry that links the prefrontal cortex to the hippocampus, while study participants performed a memory task. Participants included 11 patients with major depression, 13 with generalized anxiety disorder, nine with panic attack disorders, five with borderline personality disorder and 21 healthy individuals. All patients reported suffering varying degrees of stressful traumatic events, such as sexual or physical abuse, difficult relationships or "mobbing" - a type of bullying or harassment - at some point in their lives.

After reviewing a list of neutral word pairs, each participant underwent fMRI. During imaging, they were presented with one of the words and asked to either recall or to suppress the memory of its associated word.

The fMRI images revealed that the prefrontal cortex, which controls the suppression and retrieval of memories processed by the hippocampus, showed abnormal activation in the patients with stress-related disorders compared to the healthy controls. During the memory suppression phase of the test, patients with stress-related disorders showed greater activation in the hippocampus, suggesting that insufficient activation of the prefrontal cortex could be the basis for inadequate suppression of unwanted traumatic memories stored in the hippocampus.

"These data suggest that the mechanism for memory suppression is dysfunctional in patients with stress-related disorders primarily because of an alteration of the prefrontal cortex," Dr. Agarwal said. "These patients often complain of poor memory, which might in part be attributed to this altered circuitry," she added.

According to Dr. Agarwal, fMRI is an important tool in understanding the neurobiological basis of psychiatric disorders and in identifying imaging markers to psychiatric disease, helping clinicians target specific parts of the brain for treatment.

The study's principal investigator is Paolo Brambilla, M.D., Ph.D. Co-authors are Monica Baiano, M.D., Ph.D., Massimo Bazzocchi, M.D., Giuseppe Como, M.D., and Marta Maieron, Ph.D.

fMRIにより慢性脳卒中リハビリテーションの脳への効果が画像化される

脳卒中後6ヵ月以上経過しても意義あるリハビリテーションが可能であることが機能的MRIにより示された

Functional MRI shows significant rehabilitation is possible more than 6 months after stroke

研究者らは、手動ロボット装置と機能的MRI（fMRI）を用いて慢性脳卒中患者はこれまで考えられていたよりもリハビリ有効期間が長いことを明らかにした、とRadiological Society of North America（RSNA）学会で発表された。このスタディは、fMRIを用いて脳の地図を描き脳卒中リハビリテーションを追跡した初めてのものである。脳卒中発症後6ヵ月以上経過して開始した8週間のハンドグリップ運動の結果、前頭皮質の活性が上昇した。スタディのために患者らは特別なMR対応ロボット装置を1日1時間週3回、4週間握った。前頭皮質のfMRIをベースライン、トレーニング中、トレーニング終了直後、およびトレーニング終了から1ヵ月後に行った。トレーニング前には患者らの前頭皮質活性は8週間のトレーニング後と比較し有意に低かった（p<0.05）。上昇した皮質活性は1ヵ月後のフォローアップ時にも持続しており、リハビリテーションの持続性が示唆された。筆者らは、この結果から、これまで考えられていたよりも脳卒中後長期経過した後の脳でも順応性があり、そのため6ヵ月経過してもリハビリテーションが可能であることが示唆された、と述べている。

Full Text

Researchers used a hand-operated robotic device and functional MRI (fMRI) to demonstrate that chronic stroke patients can be effectively rehabilitated longer than previously thought according to a study presented at the annual meeting of the Radiological Society of North America (RSNA). This is the first study using fMRI to map the brain in order to track stroke rehabilitation.

"We have shown that the brain has the ability to regain function through rehabilitative exercises following a stroke," said A. Aria Tzika, Ph.D., director of the NMR Surgical Laboratory at Massachusetts General Hospital (MGH) and Shriners Burn Institute and assistant professor in the Department of Surgery at Harvard Medical School in Boston. "We have learned that the brain is malleable, even six months or more after a stroke, which is a longer period of time than previously thought."

Previously, it was believed that there was only a short window of three to six months following a stroke when rehabilitation could make an improvement.

"Our research is important because 65 percent of people who have a stroke affecting hand use are still unable to incorporate the affected hand into their daily activities after six months," Dr. Tzika said. To determine if stroke rehabilitation after six months was possible, the researchers studied five right-hand dominant patients who had strokes at least six months prior that affected the left side of the brain and, consequently, use of the right hand.

For the study, the patients squeezed a special MR-compatible robotic device for an hour a day, three days per week for four weeks. fMRI exams were performed before, during, upon completion of training and after a non-training period to assess permanence of rehabilitation. fMRI measures the tiny changes in blood oxygenation level that occur when a part of the brain is active.

The results showed that rehabilitation using hand training significantly increased activation in the cortex. Furthermore, the increased cortical activation persisted in the stroke patients who had exercised during the training period but then stopped for several months.

"These findings should give hope to people who have had strokes, their families and the rehabilitative specialists who treat them," Dr. Tzika said.

Dr. Tzika is an affiliated member of the Athinoula A. Martinos Center for Biomedical Imaging in the Department of Radiology at MGH, where the research is ongoing.

Co-authors are Dionyssios Mintzopoulos, Ph.D., Azadeh Khanicheh, Ph.D., Bruce Rosen, M.D., Ph.D., Loukas Astrakas, Ph.D., and Michael Moskowitz, M.D.

RSNA2008特集

Cardiology

ポータブルCTにより脳卒中後の生存の可能性が高くなる

fMRIにより慢性脳卒中リハビリテーションの脳への効果が画像化される

Oncology

乳房小線源療法はインプラント硬化のリスクを軽減する

MRI検査で発見された乳房病変の特徴付け

検出困難な乳がんの画像検査

新たな画像診断法により小さな乳房腫瘍を検出できる

Psychiatry

自傷行為に関する新たな知見

fMRIは記憶抑制の理解に役立つ

乳房小線源療法はインプラント硬化のリスクを軽減する

乳房小線源療法は乳房インプラント術後の女性の早期乳がんを治療し乳房の外観も維持する

Brachytherapy can successfully treat early-stage breast cancer in women with implants and preserve the breast's appearance

小線源療法で治療を受けた豊胸術後の早期乳がん女性は、乳房全体の放射線療法を受けた患者と比較し、美容上の予後が良好でありインプラント硬化のリスクを回避できるとのスタディ結果が、Radiological Society of North America（RSNA）学会で発表された。腫瘤摘出術後の乳房全体の放射線照射は選択肢ではあるが、痛みを伴い外見も損なう被膜拘縮の実質的なリスクがある。米国の研究者らはサイズの小さな早期乳がんと診断され、腫瘤摘出術後に小線源療法で治療された女性65人を組み入れた。患者らは高線量率イリジウム192小線源療法を1日2回（34Gyの照射を6時間以上空けて）5日間受けた。経過観察期間（平均16ヵ月）中に再発した者はいなかった。美容上の評価は全ての患者において、good（良）からexcellent（優秀）まで100%の患者に対して行った（95%が優秀、9%が良と評価され、fair（普通）または良と評価されたのは0%）。被膜拘縮が認められた患者および乳房内またはリンパ節内再発の認められた患者はいなかった。

Full Text

Women with early-stage breast cancer who have undergone breast augmentation may be treated successfully with brachytherapy, according to a study presented at the annual meeting of the Radiological Society of North America (RSNA). Patients treated with brachytherapy have better cosmetic outcomes and avoid the risk of the implant hardening, compared to patients who undergo whole-breast radiation therapy.

"We are seeing an increasing number of breast cancer patients with augmentation," said Robert R. Kuske Jr., M.D., clinical professor at the University of Arizona Health Sciences Center and radiation oncologist at Arizona Oncology Services in Scottsdale, Ariz. "By nature, these women are concerned about their appearance and we need to have options for them."

Approximately one in eight women who undergo breast augmentation will develop breast cancer at some point in their lives.

The most common breast cancer treatment for patients with breast implants is skin-sparing mastectomy and implant exchange. Whole-breast radiation therapy after lumpectomy is an option, but carries a substantial risk of capsular contracture, which is both painful and distorts the appearance of the breast.

Dr. Kuske set out to determine if partial-breast radiation with brachytherapy might offer a better outcome for women with implants wishing to avoid mastectomy.

Breast brachytherapy can be given in higher doses to a small, targeted area of the breast after lumpectomy. Scar tissue is minimal, the implant remains unaffected and treatment time is shortened from 6½ weeks with whole-breast radiation therapy to five days with brachytherapy.

For the study, 65 women who were diagnosed with small, early stage malignant tumors were treated with brachytherapy after a lumpectomy. The women received two doses per day, separated by six hours, over a five-day period. Follow-up was six months to five years. None of the patients experienced tumor recurrence during the follow-up period. Cosmetic outcome was determined to be good to excellent in 100 percent of patients with 95 percent judged excellent. Implant hardening was not observed in any of the patients.

"Compared to traditional treatments, brachytherapy offers an excellent alternative for these women," Dr. Kuske said. "It offers very high rates of tumor control with fewer side effects and is easier on their lifestyle."

RSNA2008特集

Cardiology

ポータブルCTにより脳卒中後の生存の可能性が高くなる

fMRIにより慢性脳卒中リハビリテーションの脳への効果が画像化される

Oncology

乳房小線源療法はインプラント硬化のリスクを軽減する

MRI検査で発見された乳房病変の特徴付け

検出困難な乳がんの画像検査

新たな画像診断法により小さな乳房腫瘍を検出できる

Psychiatry

自傷行為に関する新たな知見

fMRIは記憶抑制の理解に役立つ

MRI検査で発見された乳房病変の特徴付け

新たな統計学的モデルは乳房生検の減少に役立つ

New statistical model could help reduce breast-lesion biopsies

MRI検査により発見された乳房病変を特徴付ける新たな方法は良性腫瘍の生検を減少させる可能性がある、とRadiological Society of North America（RSNA）学会で発表された。研究者らは、乳房病変の診断に生検が必要か否かを決定する際に考慮した患者および病変の特徴を調査した。528人の患者の857病変（悪性155病変、良性702病変）が対象となった。悪性病変と最も関連のあった特徴は、washout kinetics対persistent kinetics、および臨床上の新たながん病変の徴候対ハイリスクスクリーニングであった。また、年齢（50歳以上対50歳未満）、サイズ（10mm以上対10mm未満）および病変のタイプ（mass対focus）も有意に関連があった。MRI上、悪性の可能性（PM）が最も高いのはwashoutの認められる10mm以上の病変であった（PM41.1%）。一方、がん発症のリスクが高いためスクリーニングをされた女性に発見された病変のうち、小さく（10mm未満）時間とともに造影が増強するものは良性の可能性が非常に高かった。この統計学的モデルが一般臨床で使用できることが実証されるまでにはさらなる研究が必要である。

Full Text

A new method of characterizing breast lesions found during an MRI exam could result in fewer biopsies of benign tumors with the benefits of reduced pain and expense for patients and providers, according to a paper presented at the annual meeting of the Radiological Society of North America (RSNA).

Wendy DeMartini, M.D., and colleagues in the breast imaging department at the Seattle Cancer Care Alliance (SCCA) developed a preliminary statistical model that breast radiologists could use eventually when deciding whether a lesion found on breast MRI is likely to be malignant or benign. Their retrospective review of almost 2,600 breast MRI exams performed during a four-year period at the SCCA found three crucial patient and lesion characteristics that, when used in combination, could predict the likelihood of malignancy, including identifying some lesions with probabilities of cancer close to zero.

Such a model, if confirmed by more research, could be beneficial because MRI exams are so sensitive that they reveal cancerous and non-cancerous lesions that often look alike and behave similarly when contrast dye is injected into the patient. Biopsy is often necessary to determine whether a lesion is cancerous. Statistical models may improve the ability to distinguish between such lesions and avoid unnecessary biopsies.

The researchers looked at several patient and lesion characteristics that are considered when deciding whether a biopsy is required for diagnosis.

857 lesions (155 malignant, 702 benign) were identified in 528 patients. Features most strongly associated with malignancy were washout versus persistent kinetics and clinical indication of new cancer versus high-risk screening. Also significant were age (> 50 years versus <50), size (> 10 mm versus <10) and lesion type (mass versus focus).

The highest predicted probability of malignancy (PM) was for lesions on MRI for new cancer, measuring > 10 mm with washout (PM 41.1%). In contrast, breast lesions found in women being screened because they are considered to be at high risk for developing cancer, that were found to be small lesions (<10 mm) and increased their enhancement over time were very likely to benign.

"If the lesions had those three characteristics, the likelihood of malignancy was 1 percent," said DeMartini. "This is so close to zeros that rather than doing a biopsy we could instead follow the patient by doing another MRI in a few months, or we may not need to do any additional testing." DeMartini cautioned that more research is needed before this statistical model can be validated for use as standard practice.

"This is a preliminary model. Future work will look at additional patient and lesion features and in the longer term we need to examine lesions from multiple practice sites," she said. "Our goal is to identify a group of lesions that we currently recommend for additional tests where the likelihood of cancer is so low that we can safely avoid additional testing."

RSNA2008特集

検出困難な乳がんの画像検査

乳房に特異的なガンマ線画像によりマンモグラフィやルーチンの触診では検出できない悪性腫瘍を発見できる

Breast-specific gamma imaging uncovers malignancies not found on mammography or routine physical exam

乳房に特異的なガンマ線画像（BSGI）は、マンモグラフィや触診で発見されなかった、新たに乳がんと診断された女性の浸潤性小葉がんおよび他の悪性腫瘍を検出するのに有効であるとRadiological Society of North America（RSNA）学会で発表された。BSGIはsestamibi（technicium 99m）の取り込みを計測することにより細胞の活性を評価し、がん細胞の代謝活性を評価する新型技術である。ワシントンDCにあるジョージワシントン大学の研究者らは、マンモグラフィまたは触診にて1つ以上の疑わしいあるいはがん病変が認められ、他病変の有無を確認するためBSGIを施行された女性159人の記録をレビューした。BSGIにより新たに疑わしい病変が46人（29%）に認められた。新たに発見された病変は生検を施行された女性39人中14人（36%）において悪性であった。不顕性病変の平均サイズは1.16mmであり、最小のものはわずか1mmであった。73%の女性がdense breasts（高濃度乳房）であった。筆者らは、BSGIはマンモグラフィに取って代わるものではなく、検出困難ながんの発見およびハイリスク女性のスクリーニングに用いる補助的な検査として用いるべきであると強調している。

Full Text

Breast-specific gamma imaging (BSGI) is effective in detecting invasive lobular carcinoma and other malignancies not found on mammograms or by clinical examination in women newly diagnosed with breast cancer, according to a study presented at the annual meeting of the Radiological Society of North America (RSNA).

"BSGI can identify the most difficult to detect breast cancer-invasive lobular carcinoma," said lead author Rachel F. Brem, M.D., professor of radiology and director of the Breast Imaging and Interventional Center at The George Washington University Medical Center in Washington, D.C. "It also can help us detect additional lesions of all types of breast cancer in women whose mammograms show only one suspicious lesion."

Most experts agree that the best way to decrease breast cancer mortality is through early detection using mammography and clinical breast exam. However, some cancers are difficult to detect with mammography and clinical exam, particularly in the earliest stage when treatment is most effective.

While mammography findings are characterized by the difference in appearance between normal and suspicious breast tissue, BSGI findings are based on how cancerous cells function. "It is this physiological approach to breast cancer diagnosis that allows for improved cancer detection," Dr. Brem said.

BSGI is an emerging molecular imaging technology using a high-resolution gamma camera that allows for imaging with very mild compression of the breast along with an injection of a radiotracer [sestamibi (technicium 99m)]. Because cancerous cells have a higher rate of metabolic activity, the tracer is taken up by these cells at a higher level than in normal cells. BSGI measures uptake to assess cellular activity.

Dr. Brem and colleagues reviewed the records of 159 women with at least one suspicious or cancerous lesion found by mammography or physical exam, who had undergone BSGI to determine if additional lesions were present.

BSGI results showed an additional suspicious lesion missed by mammography and physical exam in 46 (29 percent) of the women. In 14 (36 percent) of the 39 women who underwent biopsy, the newly discovered lesions were cancerous.

There are few or no contraindications with BSGI. It can be used in diabetics and in patients with compromised renal function, and there are no weight restrictions or other limitations "The data suggest that BSGI allows for the diagnosis of more and earlier breast cancers," Dr. Brem said.

Dr. Brem pointed out that BSGI is not meant to replace mammography, but to be used as an adjunct to mammography. "It is an excellent tool for locating difficult-to-detect cancers and for screening high-risk women who have normal mammograms and physical examination," she said.

新たな画像診断法により小さな乳房腫瘍を検出できる

新たな高分解能陽電子乳房撮影によりMRIよりも少ない偽陽性率で腫瘍が有効に検出できる

New high-resolution breast PET effectively detects tumors with fewer false-positive results than MRI

新たな画像診断法である陽電子乳房撮影（PEM）は、乳がん既往歴のある女性の2mmほどの小さながんを有効に検出するとRadiological Society of North America（RSNA）学会で発表された。PEMは乳がん細胞のフルオロデオキシグルコースの取り込みを計測することにより細胞の活性を評価する。この方法は、標準的なマンモグラフィやMRIではその有効性を制限する2つの因子である乳房濃度や女性のホルモン状況に影響されない。米国の研究者らは高分解能乳房陽電子断層撮影（PET）を適用したPEMを施行された乳がん患者208人の結果を発表した。撮影を行った189の悪性病変のうちPEMは176病変を検出し、全体の感度は93%（15%は非浸潤性乳管がん、85%は浸潤がん）であった。PEMはfatty breastsの100%、dense breasts（高濃度乳房）の93%、極端な高濃度乳房の85%、ホルモン補充療法歴のあるまたはない女性の93%、閉経前女性の90%および閉経後女性の94%のがんの検出に成功した。筆者らは、この検査法はグルコースベースの放射性トレーサーを使用し空腹時に行うため、糖尿病患者には適さないと警告している。

Full Text

A new imaging modality, positron emission mammography (PEM), effectively detects breast tumors as small as 2 mm in women with a history of breast cancer according to a study presented at the annual meeting of the Radiological Society of North America (RSNA). PEM is not affected by either breast density or a woman's hormonal status, two factors that limit the effectiveness of standard mammography and MRI at detecting cancer.

"The ability of PEM to detect cancer does not appear to be adversely affected by breast density, hormone replacement therapy or menopausal status," said lead researcher Kathy Schilling, M.D., director of breast imaging and intervention at the Center for Breast Care at Boca Raton Community Hospital in Florida. "The sensitivity of PEM is equal to or better than breast MRI, and PEM has fewer false-positive results."

The ability of x-ray mammography, a standard screening tool for breast cancer, to detect lesions is reduced when performed on dense breasts, where tissue is less fatty and more glandular. Breast MRI is effective at detecting cancer in dense breasts and is increasingly being used to screen women at high risk for breast cancer. However, MRI has a high incidence of false-positive test results that indicate cancer is present when it is not. Researchers believe these false positives are due in part to hormonal changes that occur during a woman's menstrual cycle.

"Unless the MRI is performed on day seven through 14 of a woman's cycle, reading MRI images is extremely difficult," Dr. Schilling said. "This is a significant problem with breast MRI."

PEM assesses cellular activity by measuring uptake of fluorodeoxyglucose by breast cancer cells. It is not affected by either breast density or a woman's hormonal status. Because hormones do not have the same effect on PEM results, Dr. Schilling believes the imaging technique could play a significant role both in preoperatively evaluating breast cancer patients and in screening high-risk patients.

In the study, 208 patients with breast cancer underwent PEM, an application of high-resolution breast positron emission tomography (PET) in which a small amount of radioactive material is injected into the body to measure metabolic activity and determine the presence of disease. The researchers used a PET unit specially developed for the breast and small body parts to perform the PEM exam.

Of 189 malignant lesions imaged, PEM detected 176 for an overall sensitivity rate of 93 percent. Fifteen percent were ductal carcinoma in situ (DCIS) and 85 percent were invasive cancer.

PEM successfully detected cancer in 100 percent of fatty breasts, 93 percent of dense breasts, 85 percent of extremely dense breasts, 93 percent of women both with and without a history of hormone replacement therapy, 90 percent of pre-menopausal women and 94 percent of post-menopausal women.

According to Dr. Schilling, PEM is well tolerated by patients, who sit upright during the exam and are not alone or closely confined as they would be during an MRI exam. While breast MRI exams produce more than 2,000 images to be interpreted, PEM produces just 48 images that can be correlated with a woman's mammogram.

"PEM is easier to use, easier to interpret and easier on the patients than MRI," Dr. Shilling said. "It is also ideal for those patients whose MRI is difficult to interpret due to hormonal influences, women with implants, patients with metal in their bodies, or patients who suffer from claustrophobia. It is exciting that we now have a functional imaging approach with high sensitivity that compliments our current anatomic imaging modalities," she added.

The authors cautioned that since the procedure uses a glucose-based radiotracer and is performed when the patient is fasting, it is unsuitable for diabetic patients.

Co-authors are Deepa Narayanan, M.S., and Judith Kalinyak, M.D., Ph.D.

自傷行為に関する新たな知見

青年期に自己埋め込み（embedding）障害として顕性化した自殺関連行動は放射線科医により診断治療される

Suicide related behavior manifested as self-embedding disorder in adolescents is diagnosed and treated by radiologists

青年期に新たに出現した異なった型の自傷行為が、放射線科医のチームにより Radiological Society of North America（RSNA）学会で初めて述べられた。自己埋め込み（embedding）障害と名づけられたこの疾患の患者は、異物を軟部組織に埋め込む。研究者らは15～18歳（17歳が圧倒的に多い）の少女10人における19のエピソードを調査した。90%の少女は自殺念慮を訴え、70%は埋め込み行動を繰り返し回数とともに埋め込む物はより大きく多くなった。有意な慢性的虐待（身体的および性的虐待）後の外傷後ストレス障害がこれらのティーンエイジャーの一般的な特徴であった。小児インターベンション放射線科医が超音波およびまたは透視下でこれらの患者に埋め込まれた52の異物を取り除いた。この埋め込まれた異物は金属針、ステープラーの針、紙クリップ、ガラス、木片、プラスチック、鉛筆の芯、クレヨンおよび石などであった。埋め込むものは長さが2～160mm、幅は0.5～3.0mmであった。埋め込む場所は首、腕、手、足首および足であった。除去作業はほとんど瘢痕を残さない小さな皮膚切開にて行われ、全ての症例において破砕や合併症を伴うことなく成功した。

Full Text

A newly emerging, distinct form of self-mutilation among adolescents was described for the first time by a team of radiologists at the annual meeting of the Radiological Society of North America (RSNA). This condition, termed self-embedding disorder, involves insertion of foreign bodies into soft tissues.

"Radiologists are in a unique position to be the first to detect self-embedding disorder, make the appropriate diagnosis and mobilize the healthcare system for early and effective intervention and treatment," said the study's principal investigator, William E. Shiels II, D.O., chief of the Department of Radiology at Nationwide Children's Hospital in Columbus, Ohio.

Self-injury, or self-harm, refers to a variety of behaviors in which a person intentionally inflicts harm to his or her body without suicidal intent. It is a disturbing trend among U.S. adolescents, particularly girls. Prevalence is unknown because many cases go unreported, but recent studies have reported that 13 to 24 percent of high school students in the U.S. and Canada have practiced deliberate self-injury at least once. More common forms of self-injury include cutting of the skin, burning, bruising, hair pulling, breaking bones or swallowing toxic substances. In cases of self-embedding disorder, objects are used to puncture the skin or are embedded into the wound after cutting.

The behavior had a number of other unique characteristics, Dr. Shiels said, the most troubling of which was a close relationship with suicidal ideation or behaviors. For example, he said, "one girl wrote 'kill me' in blood on her arm and then embedded a foreign object in her bicep."

Ninety percent of cases voiced suicidal ideation and 70% have repeated the behaviors with increasing larger and more objects. Post-traumatic stress disorder following significant chronic abuse (physical and sexual abuse) was a common feature in these teens. The 10 children included in the study shared histories of physical or sexual abuse and all were in either group homes or foster care.

Dr. Shiels and colleagues studied 19 episodes of self-embedding injury in 10 adolescent girls, age 15 to 18. Using ultrasound and/or fluoroscopic guidance, interventional pediatric radiologists removed 52 embedded foreign objects from nine of the patients. The embedded objects included metal needles, metal staples, metal paperclips, glass, wood, plastic, graphite (pencil lead), crayon and stone. The objects were embedded during injuries to the arms, ankles, feet, hands and neck. One patient had self-embedded 11 objects, including an unfolded metal paperclip more than six inches in length.

Ultrasound guidance allowed the researchers to detect the presence and location of wood, crayons and plastic objects, not detectable on x-ray examinations. Removal was performed through small incisions in the skin that left little or no scarring and was successful in all cases, without fragmentation or complications.

"This technique offers surgeons and emergency physicians a safe and effective alternative for removal of foreign bodies, including objects at risk for fragmentation during traditional operative techniques," said co-author Adam Young, B.S. "The small incision minimizes scarring and deformity, which is key for the self-esteem of this unique, high-risk group of patients."

The patient profile "suggests this is a discrete entity," Dr. Shiels said. "We couldn't find it anywhere in the literature. We have started a web-based, secure registry for physicians to submit their own cases."

Co-authors are James Murakami, M.D., Brian Coley, M.D., and Mark Hogan, M.D.

RSNA2008特集

fMRIは記憶抑制の理解に役立つ

機能的MRI画像によりストレス関連障害が前頭前野の記憶過程に影響することが示される

Functional MRI images show that stress-related disorders affect processing of memory in prefrontal lobe

機能的MRI（fMRI）を用いている研究者らは、ストレス関連記憶障害の患者における認知機能低下による記憶抑制のメカニズムは主に前頭前野の変化が原因である、とRadiological Society of North America （RSNA）学会で述べた。研究者らは脳のfMRIを用いて前頭前野と海馬を連結する神経回路の変化を調べ、スタディの対象者は記憶力テストを受けた。対象者は大うつ病11人、全般性不安障害13人、パニック発作9人、境界性パーソナリティ障害5人、および健常者21人であった。全ての参加者は人生のいずれかの時期に様々な程度のストレス性の心的外傷イベントを経験していた。fMRI画像により、海馬で形成される記憶の抑制及び回復をコントロールする前頭前野がストレス関連障害患者においては健常者と比較し異常活性を示すことが明らかになった。検査では、記憶抑制段階でストレス関連障害患者において海馬の活性の増加が認められ、前頭前野の不十分な活性化が、海馬に記憶された忘れたい心的外傷の不十分な抑制の原因でありうることが示唆された。

Full Text

Researchers using functional MRI (fMRI) have a described a dysfunctional cognitive memory suppression mechanism primarily due to alteration in the prefrontal cortex in patients with stress related disorders. Results of the study were presented at the annual meeting of the Radiological Society of North America (RSNA).

"For patients with major depression and other stress-related disorders, traumatic memories are a source of anxiety," said Nivedita Agarwal, M.D., radiology resident at the University of Udine in Italy, where the study is being conducted, and research fellow at the Brain Imaging Center of McLean Hospital, Department of Psychiatry at Harvard Medical School in Boston. "Because traumatic memories are not adequately suppressed by the brain, they continue to interfere with the patient's life."

Dr. Agarwal and colleagues used brain fMRI to explore alterations in the neural circuitry that links the prefrontal cortex to the hippocampus, while study participants performed a memory task. Participants included 11 patients with major depression, 13 with generalized anxiety disorder, nine with panic attack disorders, five with borderline personality disorder and 21 healthy individuals. All patients reported suffering varying degrees of stressful traumatic events, such as sexual or physical abuse, difficult relationships or "mobbing" - a type of bullying or harassment - at some point in their lives.

After reviewing a list of neutral word pairs, each participant underwent fMRI. During imaging, they were presented with one of the words and asked to either recall or to suppress the memory of its associated word.

The fMRI images revealed that the prefrontal cortex, which controls the suppression and retrieval of memories processed by the hippocampus, showed abnormal activation in the patients with stress-related disorders compared to the healthy controls. During the memory suppression phase of the test, patients with stress-related disorders showed greater activation in the hippocampus, suggesting that insufficient activation of the prefrontal cortex could be the basis for inadequate suppression of unwanted traumatic memories stored in the hippocampus.

"These data suggest that the mechanism for memory suppression is dysfunctional in patients with stress-related disorders primarily because of an alteration of the prefrontal cortex," Dr. Agarwal said. "These patients often complain of poor memory, which might in part be attributed to this altered circuitry," she added.

According to Dr. Agarwal, fMRI is an important tool in understanding the neurobiological basis of psychiatric disorders and in identifying imaging markers to psychiatric disease, helping clinicians target specific parts of the brain for treatment.

The study's principal investigator is Paolo Brambilla, M.D., Ph.D. Co-authors are Monica Baiano, M.D., Ph.D., Massimo Bazzocchi, M.D., Giuseppe Como, M.D., and Marta Maieron, Ph.D.