Hypothesis: Although phyllodes tumors have minimal metastatic potential, we hypothesized that they have a proclivity for local recurrence and should be excised with a wide margin. We reviewed the clinical and radiological appearance of phyllodes tumors and analyzed the role of surgical treatment in their management.

Design: Medical records, imaging studies, pathology reports, and interventions were reviewed.

Setting: A large tertiary care teaching hospital.

Patients: Between 1980 and 1997, 40 patients with phyllodes tumors were identified through the tumor registry at the Massachusetts General Hospital, Boston.

Main Outcome Measures: Surgical resection margins, rates of local recurrence, incidence of distant metastases, and survival.

Results: All 40 patients were female, with a mean age of 41 years. Each patient had a palpable mass or a mammographic finding that was indistinguishable from a fibroadenoma on examination. Tumor size ranged from 5 mm to 28 cm. Local recurrence correlated with excision margins (P<.05), but not with tumor grade or size. Local recurrence occurred in 5 patients, each of whom had positive margins or margins less than 1 cm after excision. After reexcision with a 1-cm margin, these individuals remained free of recurrence. One patient developed metastatic disease after total mastectomy and died after chemotherapy.

Conclusions: Phyllodes tumors mimic fibroadenomas and are often excised with close margins. Primary excision or reexcision with a 1-cm margin is recommended. Mastectomy is indicated for patients with large lesions. Lymph node metastases are unusual and occur secondary to necrotic tumor. Chemotherapy is based on guidelines for the treatment of sarcomas, not breast adenocarcinoma.


THE PHYLLODES tumor, a lesion limited to mammary tissue, was first described by Muller in 1838. It is a rare condition, with an incidence of 1 in 100 000, and its cause remains unclear. It is a disease almost exclusively of women and occurs most often in the third and fourth decades of life, although there are reports of occurrences in adolescents. Epidemiological data suggest that the incidence of phyllodes tumors may be higher in whites in general and in Latina whites and East Asians in particular.1,2

Most patients have a smooth, round, firm, well-defined, motile, painless mass on examination. These lesions do not have any pathognomonic mammographic or ultrasonographic features. They are difficult, if not impossible, to distinguish from fibroadenoma on physical examination or by radiological studies except when quite large. In addition, the biological behavior of phyllodes tumors cannot be assessed on the basis of their radiological appearance.3-5 There are case reports of accumulation of technetium 99 in primary6 and metastatic7 phyllodes tumors. Whether imaging modalities that use radiolabeled substances have a role in the treatment of these patients remains to be determined.

Palpable axillary lymph nodes are encountered in 20% of patients with phyllodes tumors, but histological evidence of malignancy is encountered in less than 5% of axillary lymph node dissections for clinically positive nodes. The remainder of the findings are caused by necrosis of the primary tumor. The stromal component of the phyllodes tumor is monoclonal and neoplastic.8 Structural9 and cytogenetic10 studies of constituent
PATIENTS AND METHODS

All patients diagnosed and treated for phyllodes tumors at the Massachusetts General Hospital, Boston, from January 1, 1980, through December 31, 1997, were identified by means of the institution’s tumor registry. Forty cases were identified and their medical records were examined. Data were analyzed retrospectively with review of breast imaging studies, pathology slides, and therapeutic interventions. Tumor grade was categorized as low, intermediate, or high on the basis of 5 criteria: stromal cellularity, stromal atypia, microscopic appearance of the margin of tumor (infiltrating, effacing, or bulging), mitoses per 10 high-power fields, and macroscopic size of the tumor. The main outcomes measured were local and distant recurrence rates and survival. A MEDLINE study search on the world literature on phyllodes tumors from 1966 to 1998 was also performed. The Fisher exact test was used for statistical analysis. A P value less than .05 was considered to be statistically significant.

cells have demonstrated similarities between fibroadenomas and phyllodes tumors, and there is evidence that certain fibroadenomas have the ability to progress into phyllodes tumors.11 Fine-needle aspiration is usually nondiagnostic, primarily because of the difficulty in obtaining adequate numbers of stromal cells for cytogenic analysis.12 This usually does not alter treatment plans, as most patients eventually undergo excisional biopsy or mastectomy.

The optimal treatment of patients with phyllodes tumors remains unclear. The purpose of this study is to examine the relationship between patient characteristics, surgical resection margins, tumor size and grade, rates of local recurrence, incidence of distant metastases, and survival in patients with a definitive diagnosis of phyllodes tumor.

RESULTS

DEMOGRAPHICS

All 40 patients in our series were female. The average age was 41.3 years (age range, 17-74 years). Thirty of the 40 patients were premenopausal. Thirty-five of the patients were non-Hispanic white, 2 were East Asian, 1 was African American, 1 was Middle Eastern, and 1 was Hispanic. Average age at menarche was 13.2 years (range, 10-16 years). Gravidity and parity were documented in 15 cases. The average number of pregnancies was 2.7 (range, 0-7), and the average number of deliveries was 1.9 (range, 0-6).

MEDICAL HISTORY

Twelve patients reported a personal history of having had at least 1 breast mass excised in the past. Seven patients had a previous fibroadenoma. Each of these patients had an average of 3.7 fibroadenomas excised (range, 1-13; median, 3; mode, 1). These had been excised an average of 11.1 years before the patient was found to have a phyllodes tumor (range, 5-26 years). The remaining 5 patients gave a history of pathologically documented fibrocystic disease. Biopsies had been performed 1 to 12 years before the patient was found to have a phyllodes tumor. No patient gave a history of previous breast malignant neoplasm. Eleven of these patients went on to develop low-grade phyllodes tumors. Only 1 went on to develop an intermediate-grade tumor. Three patients had a history of a malignant neoplasm of nonbreast origin. One had a right-upper-extremity melanoma, 1 a prolactinoma, and 1 an acoustic neuroma. All of these patients went on to develop low-grade phyllodes tumors.

Eight patients reported a family history of breast cancer. Only 1 of these patients went on to develop an intermediate-grade phyllodes tumor. The other 7 developed low-grade tumors. One of the 8 patients reported a family history of gynecologic malignant neoplasms. Two individuals reported a family history of colon carcinoma; one of these patients went on to develop an intermediate-grade phyllodes tumor, and the other developed a low-grade lesion.

Five patients had used or were using oral contraceptives; 3 patients had been or were taking postmenopausal hormone replacement therapy at the time of diagnosis. One of the patients using oral contraceptives developed an intermediate-grade phyllodes tumor. The other 7 patients developed low-grade tumors.

INITIAL COMPLAINT AND PHYSICAL FINDINGS

Thirty-seven patients were initially examined because of a palpable breast mass, and 7 of these patients had pain at the site of the mass. Three were asymptomatic but had a mass detected on routine mammographic screening. The length of time between detection of the mass and diagnosis was reported in 10 cases (median, 14 weeks; mode, 12 weeks).

Of the 34 patients with low-grade tumors, 17 had a left-sided and 14 a right-sided lesion. The site in 3 patients was unknown. In the group with left-sided lesions, 13 (76%) were in the upper outer quadrant, and in the group with right-sided lesions, 9 (64%) were in the upper outer quadrant. The entire breast was occupied by the mass in 1 patient with an intermediate-grade lesion and in 1 patient with a high-grade lesion.

Of the patients with low-grade tumors (n = 34), 10 had masses that measured 0 to 2 cm, 18 had masses greater than 2 to 5 cm, and 3 had masses greater than 5 cm (Table 1). In 3 of these 34 patients, size was not accurately reported. Of the patients with intermediate-grade tumors (n = 3), 2 had masses greater than 2 to 5 cm, and 1 had a mass greater than 5 cm. Of the patients with high-grade tumors (n = 3), 2 had masses greater than 2 to 5 cm and 1 had a mass greater than 5 cm.
RADIOLOGICAL FINDINGS

Mammograms were performed in 15 patients with low-grade phyllodes tumors, in 1 patient with an intermediate-grade tumor, and in 1 patient with a high-grade tumor. The tumors were described as round or lobulated and solid, with sharp, well-defined borders and occasional “popcornlike” calcifications. No differences were noted between the low-, intermediate-, and high-grade tumors. Ultrasonography was performed in 4 patients with low-grade tumors and in 1 patient with an intermediate-grade tumor. Well-defined anechoic masses were noted in all 5 studies. No differences were noted between the low- and intermediate-grade tumors.

CYTOLOGICAL EXAMINATION

Fine-needle aspiration was performed in 3 patients with low-grade phyllodes tumors confirmed by excisional biopsy. One cytological finding was negative, 1 was consistent with a fibroadenoma, and the third disclosed atypical stromal cells. The results did not alter the course of treatment for the patients, all of whom went on to have complete open excision. Fine-needle aspiration was performed in 2 patients with high-grade tumors. In one it showed atypical spindle and epithelioid stromal cells and sheets of hyperplastic epithelium; in the other it was negative for malignant cells.

SURGICAL TECHNIQUE, EXTENT OF RESECTION

Thirty-four patients with low-grade tumors were identified. After surgical resection, 4 developed local recurrences and 1 patient developed a systemic recurrence. There were 3 deaths in this group. Only 1 was attributable to the patient’s phyllodes tumor.

The initial therapy in 16 of the 34 patients was simple excision (Table 2). Eleven patients remained free of disease at an average of 32 months (range, 12-73 months). Four local recurrences, as well as the single distant recurrence, were seen in this group; all of these patients had narrow resection margins (Table 3). These patients remained free of disease an average of 57 months (range, 24-84 months) after treatment of their recurrence.

Eleven patients with low-grade tumors were treated with excision followed by immediate wide local excision. These patients were all free of disease at an average of 54 months (range, 26-73 months). Five of the 34 patients with low-grade tumors were treated by simple excision followed by immediate total mastectomy. All of these patients were free of disease at a mean follow-up of 48 months (range, 26-132 months). Two patients with low-grade tumors were treated with immediate total mastectomy. They both remained free of disease at an average of 35 months (range, 34-36 months) of follow-up. There was 1 death in this group secondary to metastatic breast adenocarcinoma that developed in the contralateral breast.

Three patients with intermediate-grade phyllodes tumors were identified (Table 2). One patient had a simple

Table 1. Distribution of Tumors Based on Size and Grade*

<table>
<thead>
<tr>
<th>Tumor Grade</th>
<th>No. of Tumors by Tumor Size, cm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-2</td>
</tr>
<tr>
<td>Low†</td>
<td>10</td>
</tr>
<tr>
<td>Intermediate</td>
<td>0</td>
</tr>
<tr>
<td>High</td>
<td>0</td>
</tr>
</tbody>
</table>

*Criteria used for grading: stromal cellularity, stromal atypia, tumor edge characteristics, mitoses per 10 high-power fields, and macroscopic size.
†Size in 3 tumors was not specified.

Table 2. Outcome Based on Surgical Procedure

<table>
<thead>
<tr>
<th>Tumor Grade</th>
<th>No Evidence of Disease</th>
<th>Local Recurrence</th>
<th>Metastasis</th>
<th>Death</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple excision</td>
<td>11</td>
<td>4</td>
<td>1</td>
<td>2*</td>
<td>16</td>
</tr>
<tr>
<td>Low</td>
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<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Intermediate</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>High</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Simple excision followed by immediate local excision</td>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>Low</td>
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<td>0</td>
<td>0</td>
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<td>1</td>
</tr>
<tr>
<td>Intermediate</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>High</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
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<tr>
<td>Simple excision followed by total mastectomy</td>
<td>5</td>
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<td>0</td>
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<td>5</td>
</tr>
<tr>
<td>Low</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Intermediate</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>High</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total mastectomy</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>3</td>
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<td>0</td>
</tr>
<tr>
<td>Intermediate</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

*One of these patients had a local recurrence and died of squamous cell carcinoma of the mandible. The other developed systemic recurrence and died of complications related to phyllodes tumor.
Phyllodes tumors are mesenchymal tumors of the breast that exhibit a range of clinical and pathological presentations. When viewed as part of a broad spectrum, low-grade phyllodes tumors might be conceptualized as being further along a continuum than a hypercellular fibroadenoma, while high-grade phyllodes can be thought of as connective-tissue tumors that are less aggressive than most sarcomas. Despite this gradation, as arbitrary as it might be, the influence of patient age, histopathological features, DNA content, and resection margins on local recurrence in patients undergoing surgical excision for phyllodes tumors is controversial. Unlike some previous studies but similar to others, we were unable to demonstrate a correlation between pathological grade of phyllodes tumor and clinical behavior. The inability to demonstrate a relationship, which makes it difficult to make specific treatment recommendations based on grade, may result from an insufficient number of patients with high-grade phyllodes tumors and differences in histological grading between pathologists.

A mean systemic recurrence rate of 13.6% (range, 3.2%-25%) for phyllodes tumors has been reported in the international literature. In our study, the recurrence rate was 15%; all of these recurrences were in patients with resection margins around the primary tumor that were less than 1 cm. This is not to say that a patient with an 8-mm margin is destined to have a recurrence; however, it is apparent from our data that patients who did have recurrences had narrow margins and those with margins of 1 cm (or greater) did not have local recurrences. While the exact margin was not specified in all of the patients in this latter group, margins greater than 1 cm do not appear to be necessary when a phyllodes tumor is resected, irrespective of size or grade.

Metastatic disease can involve the lungs, thigh, pleura, sacrum, axial skeleton, pancreas, central nervous system, and mandible. Statistically significant correlations between tumor grade and metastatic disease, and death (Table 4).

### CHEMOTHERAPY AND RADIATION THERAPY IN THE MANAGEMENT OF PHYLLODES TUMORS

Only 1 patient received systemic therapy that was administered after the diagnosis of metastatic disease (Table 3). The treatment regimen included prophylactic whole-brain irradiation, and chemotherapy consisting of mesna, doxorubicin hydrochloride, and ifosfamide. The patient died of disease 2 months after the diagnosis of metastatic disease. One patient with a high-grade tumor received chest wall radiation for a local recurrence that could not be completely extirpated surgically. The patient remained free of disease 84 months after recurrence.
nal overgrowth, high mitotic rate, cytological atypia, and metastatic disease—have been demonstrated in the literature. The designation stromal overgrowth, a microscopic term indicating that the stroma has replaced the glandular elements of the breast, is thought to be an important determinant of metastatic potential.

Salvage therapy may be useful in the setting of recurrent phyllodes tumors. We treated 1 patient with residual tumor on the chest wall who received external beam radiation and was disease-free at 12 years. There are sporadic reports in the literature of responses to radiation therapy for chest wall recurrences. Chemotherapy has not been proved to be of benefit in this disease and does not appear to have any adjuvant role. Doxorubicin has been used with some success in the setting of uncontrolled systemic dissemination. The use of chemotherapy in the treatment of patients with metastatic phyllodes tumors is based on guidelines for the treatment of sarcomas, not breast cancer. Hormonal therapy has not been described in this setting, but the literature reports use of tamoxifen in selected patients. Other endocrine agents, such as antiestrogens, have been used with some success.

In our study, the behavior of low-grade tumors was similar to that previously reported with the exception of a subgroup that behaved aggressively, resulting in 6 episodes of local recurrence in 4 patients and 1 death from metastatic disease. Patients with these aggressive low-grade tumors demonstrated a greater likelihood of experiencing notable pain at the site of the mass or of having a history of hormonal therapy or oral contraceptive use. None of these associations reached statistical significance. There may also be a tendency to undertreat these lesions, as they continued to recur despite repeated wide local excisions. On completion mastectomy, however, patients remained free of disease at long-term follow-up.

In summary, the diagnosis of phyllodes tumors should be considered in all patients with a history of a firm, rounded, well-circumscribed, solid (noncystic) lesion in the breast. Simple excisional biopsy should be performed if aspiration fails to return cyst fluid or if ultrasound demonstrates a solid lesion. Because phyllodes tumors mimic fibroadenomas, they are often enucleated or excised with a close margin. If a 1-cm margin has not been obtained after examination of the permanent section, the patient should undergo reexcision to obtain wider margins. Otherwise, a recurrence rate of 15% to 20% can be expected. If the mass of breast tissue is such that simple excision cannot be accomplished without gross cosmetic deformity, or if the tumor burden is too large, a simple mastectomy may be performed. If mastectomy does not yield a 1-cm margin, or if chest wall invasion is noted, postoperative radiation therapy with a boost to the surgical bed should at least be considered (Figure). Axillary lymph node dissection is to be reserved for clinically palpable nodes only.

This approach should be adequate for all age groups and for all grades of tumor. Patients with a diagnosis of phyllodes tumors should be followed up closely with physical examinations and mammograms. If there is a concern of local recurrence, simple excisional biopsy with the aim of 1-cm margins is the surgical goal. If this is not possible without residual cosmetic deformities or because of the tumor burden, completion mastectomy should be performed. A “watch and wait” policy may be adopted after a first recurrence. After a second recurrence, total mastectomy must be considered for definitive local control. Breast reconstruction may be performed at the time of mastectomy.


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**DISCUSSION**

Kirby I. Bland, MD, Providence, RI: When the term phyl- losses tumor was first coined by Muller in 1838, the term meant only a “fleshy” tumor. The general use of the term to mean a tumor with predicted malignant behavior did not arise until several decades later. Pathologists now regard the term cystosarcoma as an example of outmoded 19th-century descriptive medical terminology—phyllodes tumor is now the preferred designation.

The histological appearance of this neoplasm seems to be identical to that of the large fibroadenoma unless specific characteristics are sought. Fechner suggested that phyllodes tumors exhibit stroma of great cellularity and cell activity, while fibroadenomas show 3 or 4 mitoses per high-power field. Page et al also adhere to this definition and suggest that the factor defining a phyllodes tumor is the close applic- ation of a particularly cellular connective tissue element to the basement membrane of the epithelial elements. Authorities suggest that size of the tumor should have no part in differentiating between these mixed tumors of the breast. Clearly, the differentiating feature of the majority of malignant (metastatic) phyllodes tumors reported has been over- growth of an obvious sarcomatous element of the neoplasm. Moreover, this malignant element is typically liposarcoma or rhabdomyosarcoma—not fibrosarcoma.

As indicated by the authors, these tumors have the pro- clivity to recur locally when incompletely excised; however, dis- tant metastases are uncommon. Hence, patients diagnosed with the typical phyllodes tumor of low or intermediate grade have an excellent prognosis. Further, the principal determinant of prognosis for malignant features is number of mitoses, rather than size of the presenting tumor.

The predictors of local recurrence, metastasis, and death, as indicated by the authors, include 2 pathological features that correlate statistically: (1) presence of tumor at the excision margin and (2) a surgical margin less than 1 cm. Of interest, recur- rence, metastasis, and death are unrelated to grade or size of the presenting tumor. My first question: The authors observed that mitoses/HPF or grade does not correlate with recurrence, metastases, or death. Is this suggestive of a β error due to the small (total) number of cases in the subsets? Do these limited parameters allow such differentiation of statistical outcomes?

Clearly, the size of the neoplasm may determine whether compromised or generous surgical tumor margins are attained. The presence of a large tumor in a small or medium-size breast may afford only minimal surgical margins, and therefore may require total mastectomy. Do you recommend immediate reconstruction following total mastectomy? Further, are there individuals in whom you recommend low-level (level I and II) auxiliary dissections in cly- nically negative axillae? Are there circumstances (high grade, size of tumor) in which you would recommend sampling or resection of low or multiple levels of nonpalpable nodal disease? Do grade and nodal palpability enter into this decision process?

The margins of resection that you recommend (1-2 cm) are those that surgeons typically strive to achieve for DCIS and for invasive lobular/ductal carcinoma. Do you consider adding adjuvant radiation therapy when tumors closely approxi- mate the chest wall or when attainable margins are less than 1 cm? Please give us more details of your experience and rec- ommendations for radiotherapy in the treatment of these high-grade tumors.

Blake Cady, MD, Providence: I would like to question the author on the diagnosis of low-grade small-sized lesions in patients who had multiple previous fibroadenomas and how their pathologists reliably distinguish this lesion from fibroad- enomas. I wonder if these were prospective data in any case, or were these retrospective analyses of obviously large num- bers of fibroadenomas? I would question whether the pres- ence of a local recurrence, which can also be seen in a fibro- adenoma if it’s not taken out with reasonable margins, is the definition of the term sarcoma.

Robert Quinlan, MD, Worcester, Mass: Do all the sur- geons of the Society believe fibroadenomas should be re- moved in young people, if it’s a classic presentation in a young woman? (Show of hands.) Is there anyone who would dis- agree with the routine removal of a classic fibroadenoma? Dr Deckers, I would be impressed with whether you would sug- gest we remove all small clinical fibroadenomas in young women, based on the fact that we might miss an early cyto- sarcoma. I should also alert the membership, there is a ran- domized study going on from Dartmouth . . . numbers of cytosarcoma are very minimal in New England, and Dr Barth of Dartmouth is looking for as many patients as possible. Dr Barth is doing a study on routine use of radiation therapy after excision for these “sarcomas.”
Dr Mangi: To refer to Dr Bland’s first question, that of the small number of our study, we feel that is limited by the rare occurrence of this tumor. This study was one of the largest single institutional studies that we reported, and certainly one of the limitations of it is that the numbers of intermediate-grade and high-grade tumors are relatively low, and that certainly does impact on the data that we’ve presented.

Regarding the issue of immediate reconstruction, it's difficult to comment definitively on this given the limited number of cases. There are reports of immediate reconstruction after resection of phyllodes tumor, and it would seem to be more feasible in the setting of low-grade tumors once it has been definitively shown that clear margins have been achieved. That certainly would be an option due to the fact this disease is seen in younger women predominately.

Regarding the issue of axillary dissections, palpable lymphadenopathy is encountered in less than 20% of patients, and less than 5% of those patients actually have metastatic disease in their lymph nodes, so we would not recommend axillary dissection in the setting of nonpalpable lymph nodes.

Regarding the issue of planned radiation vs chemotherapy, again we’re limited by the rarity of this tumor. The situations in which we would recommend it would be (1) a high-grade tumor, (2) the presence of tumor at the chest wall where adequate resection margins cannot be attained, and (3) in a patient adamantly opposed to mastectomy, who would undergo lumpectomy with radiation therapy.

Regarding Dr Cady’s question of distinguishing between fibroadenoma and phyllodes tumor, certainly that is an issue of much contention, and 7 of our patients had had multiple excisions of what were called fibroadenomas and may have actually been phyllodes tumors. We did not go back and actually review that data, but our pathologists used the standard criteria, especially mitotic activity, invasion, and stomach overgrowth in attempting to differentiate between fibroadenoma and phyllodes tumors in our resected specimens.

Finally, addressing the question proposed by Dr Quinlan, whether or not we would advocate removal of small fibroadenomas in young women, certainly this tumor is seen most commonly in women in their third and fourth decades of life, and interestingly enough, the patients with the most clinically aggressive tumors actually have low-grade tumors, so there may be an argument to be made for actually excising fibroadenomas in young women for the purpose of establishing diagnosis and making sure that a low-grade tumor is not missed.

JAMA
Analysis of Missed Cases of Abusive Head Trauma

Carole Jenny, MD, MBA; Lt Col Kent P. Hymel, MD, USAF, MC; Alene Ritzen, MD, JD; Steven E. Reinert, MS; Thomas C. Hay, DO

Context: Abusive head trauma (AHT) is a dangerous form of child abuse that can be difficult to diagnose in young children.

Objectives: To determine how frequently AHT was previously missed by physicians in a group of abused children with head injuries and to determine factors associated with the unrecognized diagnosis.

Design: Retrospective chart review of cases of head trauma presenting between January 1, 1990, and December 31, 1995.

Setting: Academic children’s hospital.

Patients: One hundred seventy-three children younger than 3 years with head injuries caused by abuse.

Main Outcome Measures: Characteristics of head-injured children in whom diagnosis of AHT was unrecognized and the consequences of the missed diagnoses.

Results: Fifty-four (31.2%) of 173 abused children with head injuries had been seen by physicians after AHT and the diagnosis was not recognized. The mean time to correct diagnosis among these children was 7 days (range, 0-189 days). Abusive head trauma was more likely to be unrecognized in very young white children from intact families and in children without respiratory compromise or seizures. In 7 of the children with unrecognized AHT, misinterpretation of radiological studies contributed to the delay in diagnosis. Fifteen children (27.8%) were reinjured after the missed diagnosis. Twenty-two (40.7%) experienced medical complications related to the missed diagnosis. Four of 5 deaths in the group with unrecognized AHT might have been prevented by earlier recognition of abuse.

Conclusion: Although diagnosing head trauma can be difficult in the absence of a history, it is important to consider inflicted head trauma in infants and young children presenting with nonspecific clinical signs. (1999;281:621-626) www.jama.com

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