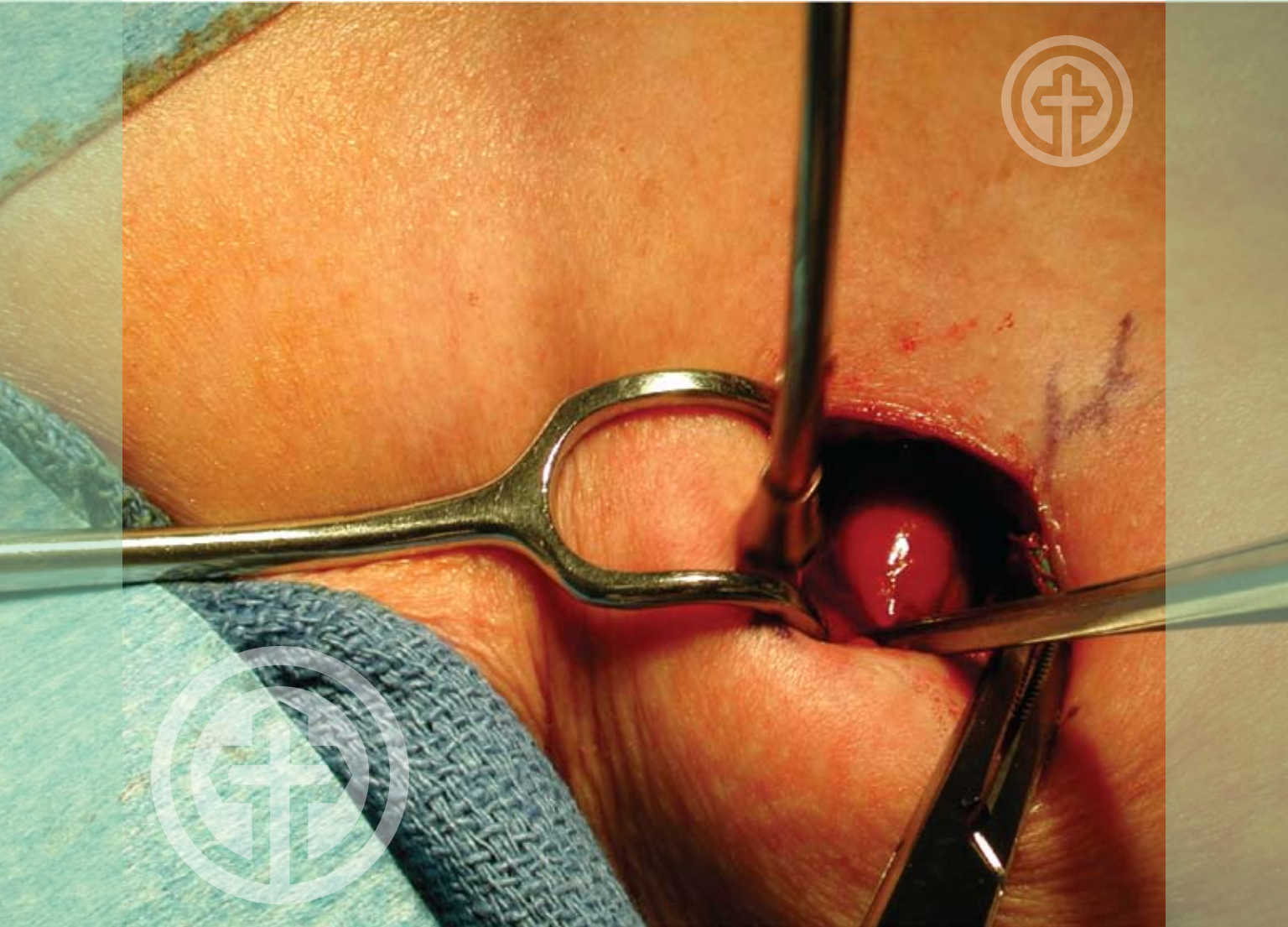


YOUR PARTNER IN
Good Health



Seton Family of Hospitals

MANAGING PRIMARY
HYPERPARATHYROIDISM

A new surgical technique is being used to treat patients with Primary Hyperparathyroidism: *Minimally Invasive Radio-Guided Parathyroidectomy* utilizes preoperative imaging to improve surgical outcomes.

A2

SKULL-BASED TUMOR:
*MULTI-MODALITY TREATMENT OF
VASCULAR SKULL BASED PATHOLOGY*

A 53-year-old female presented with a 12-month history of ear pain and occasional vertigo. Audiometrics found a significant unilateral sensorineural hearing loss, followed by an angiogram that revealed two unruptured aneurysms.

A4

Managing Primary Hyperparathyroidism

By Charles Livingston, MD, FACS

Frequently, the primary care physician is faced with the finding of elevated serum calcium on a patient's routine blood screening test. The possible causes for this abnormality include malignancy, myeloma, drugs such as thiazides, Paget's disease, thyrotoxicosis, addisonian crisis, sarcoid and acute renal failure. But the most likely cause is Hyperparathyroidism. Hyperparathyroidism can be either secondary, which is related to underlying renal disease, or primary, related to an abnormality of the parathyroid glands.

Within the diagnosis of Primary Hyperparathyroidism, approximately 5 percent of patients have Familial Hyperparathyroidism associated with the syndrome of Multiple Endocrine Neoplasia (MEN) and have disease effecting more than one of the four parathyroid glands. A family history helps to exclude MEN; patients should be questioned regarding relatives with medullary carcinoma of the thyroid, pheochromocytoma, pancreatic tumors, pituitary tumors or parathyroid adenomas. However, in most series, 95 percent of patients with primary Hyperparathyroidism have a single adenoma as the cause of the problem.

The overall incidence of Primary Hyperparathyroidism is approximately 1.5 per 100 with more than 100,000 new cases diagnosed each year. It is found four times more frequently in women than men, perhaps due to screening initiatives to detect osteoporosis in women.

In the past, operative therapy was offered to patients with severe disease such as recurrent nephrolithiasis or advanced osteitis fibros cystica. However, recently, it has been recognized that a majority of patients present with non-specific, but very real complaints of depression, fatigue, change in cognition, depression and musculoskeletal symptoms. Many patients are recognized when they present with severe or premature osteoporosis. Recent studies have shown that more than 90 percent of patients with Primary Hyperparathyroidism are symptomatic. Because of this, and due to the low morbidity associated with surgical correction, it has been suggested

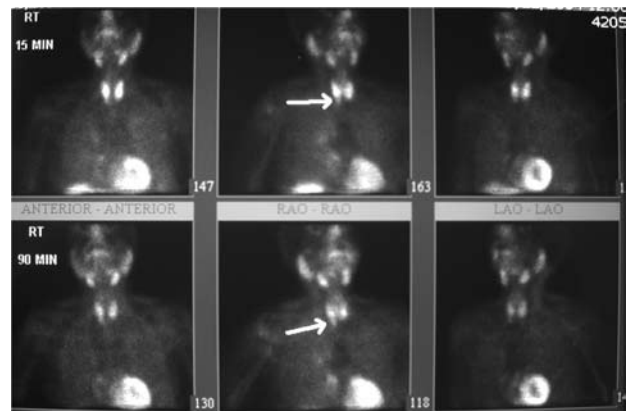


Figure 1: MIRP Sestamibi Scan

that most patients with Primary Hyperparathyroidism be referred for surgical treatment.

The diagnosis of Primary Hyperparathyroidism is usually established by the findings of an elevated serum calcium and an inappropriately elevated serum Parathormone level (PTH). A measurement of serum creatinine is performed to exclude end stage renal disease and a measurement of urinary calcium excretion is performed to quantify the amount of excretion and to exclude the very rare diagnosis of Familial Hypocalcemia. Patients with Primary Hyperparathyroidism usually have normal to elevated urinary calcium excretion.

In the past, surgeons felt it was necessary to explore the entire neck in patients with Primary Hyperparathyroidism in an effort to visualize and biopsy all four parathyroid glands. However, most patients have



Figure 2: Hand-Held Gamma Probe

only a single enlarged adenoma; the other three normal glands are commonly reduced in size and difficult and unnecessary to locate.

Fortunately, our radiology colleagues have recently developed new imaging techniques that enable us to locate the parathyroid adenoma preoperatively. This new imaging technique is ⁹⁹Tc Sestamibi scanning (MIBI), which is ideally performed using single photon emission computed tomography (SPECT). Sestamibi is concentrated in the parathyroid adenoma. (See Figure 1.) This technique will locate the adenoma in 80 percent of patients.

Utilizing this new tool, surgeons at Seton now perform a new operation for patients with Primary Hyperparathyroidism: Minimally Invasive Radio-Guided Parathyroidectomy (MIRP), which utilizes preoperative imaging with MIBI to locate the adenoma.

Just before the operation, the patient is given a small dose of sestamibi to be used as a biologic nuclear marker. The surgeon then uses a hand-held gamma probe that reads the location of the radioactive hot spot in the patient's neck. (See Figure 2.) This enables the surgeon to locate the adeno-

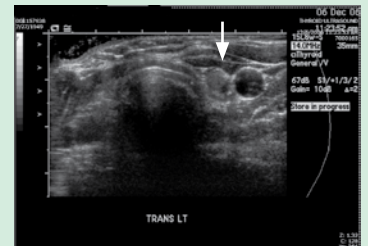
ma and remove it through a small incision. (See Figures 3-4, page A6.) The adenoma is confirmed by measuring its radioactivity, which allows for the completion of the operation without relying on time consuming frozen section examinations.

We have performed more than 250 MIRP operations at Seton since 2001 and published the results in the December 2006 issue of *Endocrine Practice*. We found that when compared to the old method of complete four gland exploration, patients who underwent MIRP had significantly shorter operative times (38 minutes) and hospital length of stay (16 hours). Two-thirds of MIRP patients were discharged from day surgery. Patients usually can return to normal activity the next day.

However, about 20 percent of patients with primary Hyperparathyroidism will have negative preoperative MIBI scans. This subgroup of patients is currently being studied using preoperative Surgeon Directed Sonography. In this technique, the operative surgeon performs sonography just before making the incision. Using directed sonography, we have

Case Report

A 50-year-old woman was found to have osteoporosis during routine screening examination. Subsequent serum calcium was found to be 10.8 (normal <10.5) with a serum Parathormone level of 82 (normal <65). Urinary calcium excretion was 425 (normal 100-250). A Tc Sestamibi scan was performed and showed a left inferior parathyroid adenoma; the location was confirmed by sonography performed by the operating surgeon.



Left Inferior Parathyroid Adenoma

The patient underwent Minimally Invasive Radio-Guided Parathyroidectomy and was discharged from the day surgery area following her stay in the recovery room. She was seen in follow-up in the office one week later at which time her serum calcium was 9.0. She was continued on daily doses of calcium and vitamin D and was asked to obtain a follow-up bone density scan in six months.

Continued on Page A6

Skull-Based Tumor:

Multi-Modality Treatment of Vascular Skull Based Pathology

By Craig Kemper, MD, FACS

PATIENT HISTORY

The patient is a 53-year-old female who presented with a 12-month history of ear pain and occasional vertigo. Her symptoms had been slowly progressing when she presented to an ENT who performed audiometrics and found a significant unilateral sensorineural hearing loss.

An MRI of her head and internal auditory meatus was performed (shown in Image A).

An angiogram of her head was performed to assess the vascular component of the lesion and revealed two unruptured aneurysms (shown in Image B).

Upon further examination, the patient displayed mild hypesthesia in the right fifth nerve distribution, unsalvageable hearing on the right and slight facial asymmetry. She was offered observation of her lesion until follow-up MRI showed growth in the posterior fossa portion of her tumor. At this point, she was considered for surgery. She pursued several opinions from experts within the United States, including Sloan Kettering, the University of Arkansas and the NIH. After researching her options, the patient chose the Brain & Spine Center at Brackenridge Hospital.

The decision to treat her was reached by a team of physicians, including Neuropathology, Interventional Radiology, Neuro-Otology, Neurophysiology and skull-based Neurosurgery experts.

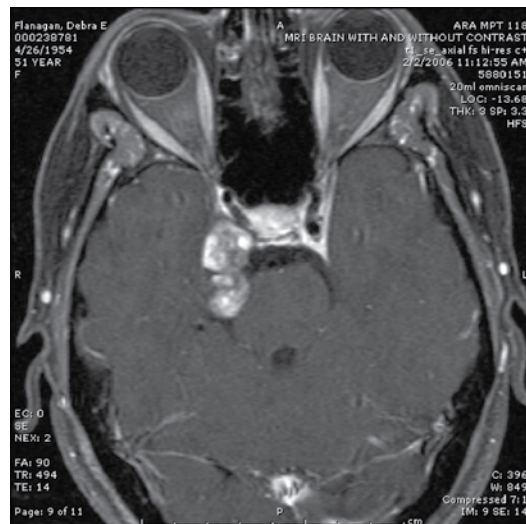


IMAGE A: PRE-OP MRI

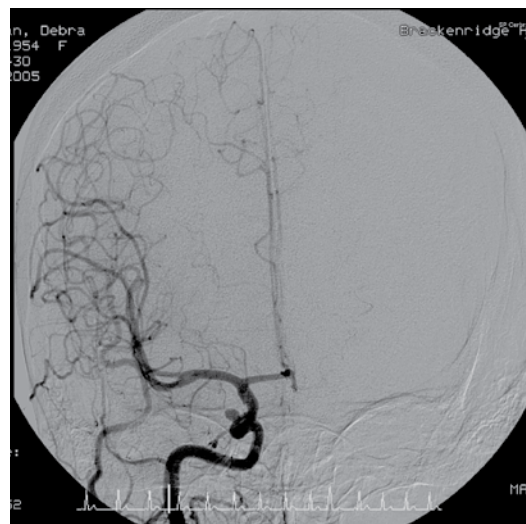


IMAGE B: ANGIOGRAM

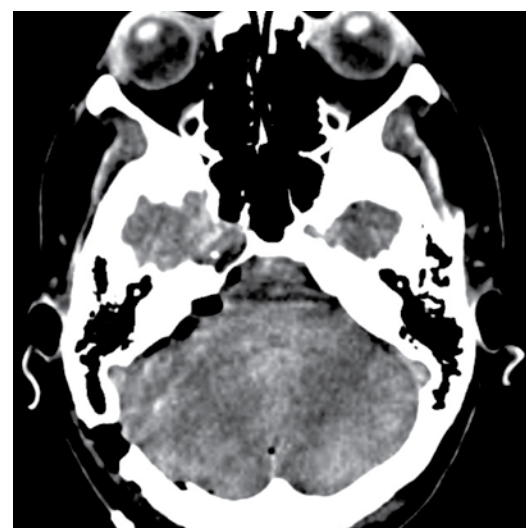


IMAGE C: POST-OP MRI

The aneurysms were believed to be asymptomatic, but crucial to a successful outcome. The shifts in blood volume and blood pressure during the proposed surgery would threaten the integrity of the aneurysms possibly resulting in a catastrophic event. By collecting opinions from the treatment team, we proposed a safe plan of attack for the patient's multiple pathologies.

TREATMENT COURSE

Firstly, the aneurysms were treated by an interventional approach called coiling.

The second phase of the treatment was the surgical removal of the growing portion of the tumor, which required a combined Neurosurgery/ Neuro-Otology approach to the cerebello-pontine angle from a retromastoid procedure. This very delicate surgery requires the assistance of a Neurophysiologist who monitors the function of the brainstem and cranial nerves while the patient is under anesthesia.

The tumor was resected from the seventh, eighth, ninth and 10th cranial nerves. It had invaded both the vestibular and auditory nerves on the right. At the completion of the surgery,

it appeared that the patient had two separate tumors, the second of which extended through the base of the skull and came to sit next to the oculomotor and abducens nerves and the carotid artery.

The pathology showed the tumor to be a benign schwannoma.

OUTCOME AND FOLLOW UP

The patient recovered to preoperative status in a short amount of time and was discharged to home on the fourth postoperative day. Her follow-up scans showed a gross total resection of the posterior portion of the mass and the residual supratentorial component (shown in Image C).

The third phase of her treatment occurred after two years of follow up. The patient's residual supratentorial component was felt a risk to her optic motor apparatus, and the carotid artery. Now that the size of the target had been drastically reduced by surgery and the pathology had been established, CyberKnife Stereotactic Radiosurgery was employed to remove the remaining pathological tissue. She now enjoys spending time with her husband and young daughter.





Figures 3-4: Parathyroid Adenoma

been able to accurately locate 95 percent of parathyroid adenomas even in those with negative MIBI scans. Patients treated in this fashion have short operative times (average 46 minutes) and short hospital length of stay (17.8 hours), again, significantly less than corresponding values for the old method of four gland exploration.

Therefore, by using the combination of both MIBI scanning and Surgeon Directed Sonography, we are able to preoperatively identify the location of the adenoma in 95 percent of cases resulting in much shorter operative time and hospital length of stay for these patients.

Seton Medical Center is the first hospital in Texas to offer Minimally Invasive Radio-Guided Parathyroidectomy for correction of Primary Hypercalcemia.

Annually 100,000 Americans will be diagnosed as having Primary Hyperparathyroidism, which can cause nephrolithiasis, renal insufficiency, osteoporosis, depression, change in mentation and musculoskeletal symptoms. In the past, surgical treatment required a time-consuming four gland exploration. Newer imaging techniques including MIBI scanning and Surgeon Directed Sonography results in the accurate preoperative location of 95 percent of adenomas and allows the surgeon to perform a Minimally Invasive Radio-Guided Parathyroidectomy. This technique

provides the patient a much shorter operative time, a smaller incision and a shorter hospital stay while at the same time correcting the underlying hypercalcemia.

Benefits of Minimally Invasive Radio-Guided Parathyroidectomy

- Smaller incision.
- Directed unilateral exploration, less morbidity.
- Shorter hospital length of stay, patient can be discharged from day surgery.
- Correction of hypercalcemia in 99 percent patients.

For more information about Primary Hyperparathyroidism and Minimally Invasive Radio-Guided Parathyroidectomy, contact:

Charles Livingston, MD, FACS • Austin Surgeons
3901 Medical Parkway, Suite 200 • Austin, Texas 78756 • (512) 467-7151

Continuing MEDICAL EDUCATION

Seton Family of Hospitals

*Brackenridge Adult Cancer Management Conference

Brackenridge Hospital
9th Floor Conference Room
4th Wednesday, 7 - 8 a.m.

*Brain & Spine Clinical Grand Rounds

Brackenridge Hospital
9th Floor Conference Room
4th Friday, 7 - 8 a.m.
For more information, please contact Lauren Brandt at lbrandt@seton.org or 512/324-7782

*Breast Pre-treatment Management Conference

Brackenridge Hospital
9th Floor Conference Room
1st Monday, 12:15 - 1:15 p.m.

*Central Texas Monthly Pulmonary Chest Conference

Seton Medical Center Austin
Front half of McFadden Auditorium
1st Wednesday of every month, Noon - 1 p.m.

Clinical Psychopharmacology and Therapeutics Lecture Series

Seton Shoal Creek Hospital
6th Floor Large Classroom
Wednesdays, 12:30 - 2 p.m.
Please note: The lecture is not offered June - August

Faculty Development Series

Clinical Education Center and Children's Hospital of Austin
2 days/month, 12:15 - 1:15 p.m.
For more information on location and dates, please contact Adriane at (512) 324-7860

Internal Medicine Grand Rounds

Brackenridge Hospital
The Annex Classroom
1st and 3rd Thursday, 12:30 - 1:30 p.m.

*Invasive Cardiology Morbidity and Mortality Meeting

Seton Medical Center Austin
McFadden Auditorium
Oct. 24, 5:30 - 7:30 p.m.

The following activities are offered throughout the Seton Family of Hospitals.

Neonatal Grand Rounds

Location alternates between Brackenridge/Children's Hospital of Austin and Seton Medical Center Austin
3rd Tuesday every other month, except in March and July, Noon - 2 p.m.

OB/GYN Grand Rounds

Seton Medical Center Austin Boardroom
3rd Monday, months TBD, 12:15 - 1:15 p.m.

*Pediatric Cancer Management Conference

Dell Children's Medical Center of Central Texas
DCMCCT Auditorium
3rd Tuesday, 12:15 - 1:15 p.m.

*Pediatric Cardiac Conference

Brackenridge Hospital
Emergency Department Conference Room
Every Friday, 7 - 8 a.m.

Pediatric Grand Rounds

Dell Children's Medical Center of Central Texas
Auditorium - 3s.064CA
2nd and 3rd Thursdays, 12:15 - 1:15 p.m.

*Pediatric Trauma Performance Improvement

Dell Children's Medical Center of Central Texas
4th Floor Respiratory
1st Friday, 12:45 - 1:45 p.m.

Psychiatry Grand Rounds

Seton Shoal Creek Hospital
1st Floor Classroom
4th and 5th Tuesdays, 12:30 - 2 p.m.
(Please note: the lecture is not offered June - August.)

Seton Medical Center Grand Rounds

Seton Medical Center Austin
Front half of McFadden Auditorium
Every Thursday, except 2nd Thursday, 7 - 8 a.m.

*Seton Medical Center Adult Cancer Management Conference

Seton Medical Center Austin
Front half of McFadden Auditorium
2nd Thursday, 7 - 8 a.m.



*GYN Cancer Management Conference

Seton Medical Center Austin Boardroom
Quarterly (Jan, Apr, July, Oct), 3rd Monday, 12:15 - 1:15 p.m.

*Seton Northwest Adult Cancer Management Conference

Seton Northwest
Private Dining Room 2
3rd Thursday, 12:15 - 1:15 p.m.

*Stroke Case Conference

Location varies: Brackenridge Hospital - 2 North Conference Room, or Seton Medical Center Austin - Support Services Conference Room
3rd Thursday every other month beginning in February, Noon - 1 p.m.

*Transplant Board Meetings

Seton Medical Center Austin Boardroom
2 Wednesdays/month, date varies, 7 - 8 a.m.

*Trauma Rounds

Brackenridge Hospital
9th Floor Conference Room
Every Thursday, except 3rd Thursday
6:45 - 7:45 a.m.

* Open to all Seton medical staff members, but closed to non-Seton medical staff and all others.

Q&As

Are the programs listed above open to all physicians?

Activities are open to all Seton medical staff. An activity with an asterisk is closed to non-Seton medical staff and all others.

How do I obtain my CME report?

Contact Medical Staff Services at (512) 324-1000, ext. 10057.

How much do CME reports cost?

CME reports are free of charge for members

of Seton's Medical Staff and are \$25 for all others.

What is the registration fee for CME programs?

CME activities are free of charge, but the majority of special conferences charge a fee. These conferences can be located on DoctorLink at www.doctors.seton.org.

Could I submit topics for an activity or present an activity myself?

Yes. If you are interested in a specific topic, would like to present at one of the activities or require more information regarding the

application process, please contact the CME office at (512) 324-3023.

Get CME Credits for Your Activity

Does Seton participate in Joint Sponsorships?

Yes. Please call (512) 324-3023 for more information about applying for a Joint Sponsorship activity.

For more information regarding the application process, please contact the CME office at (512) 324-3023 or visit DoctorLink at www.doctors.seton.org.