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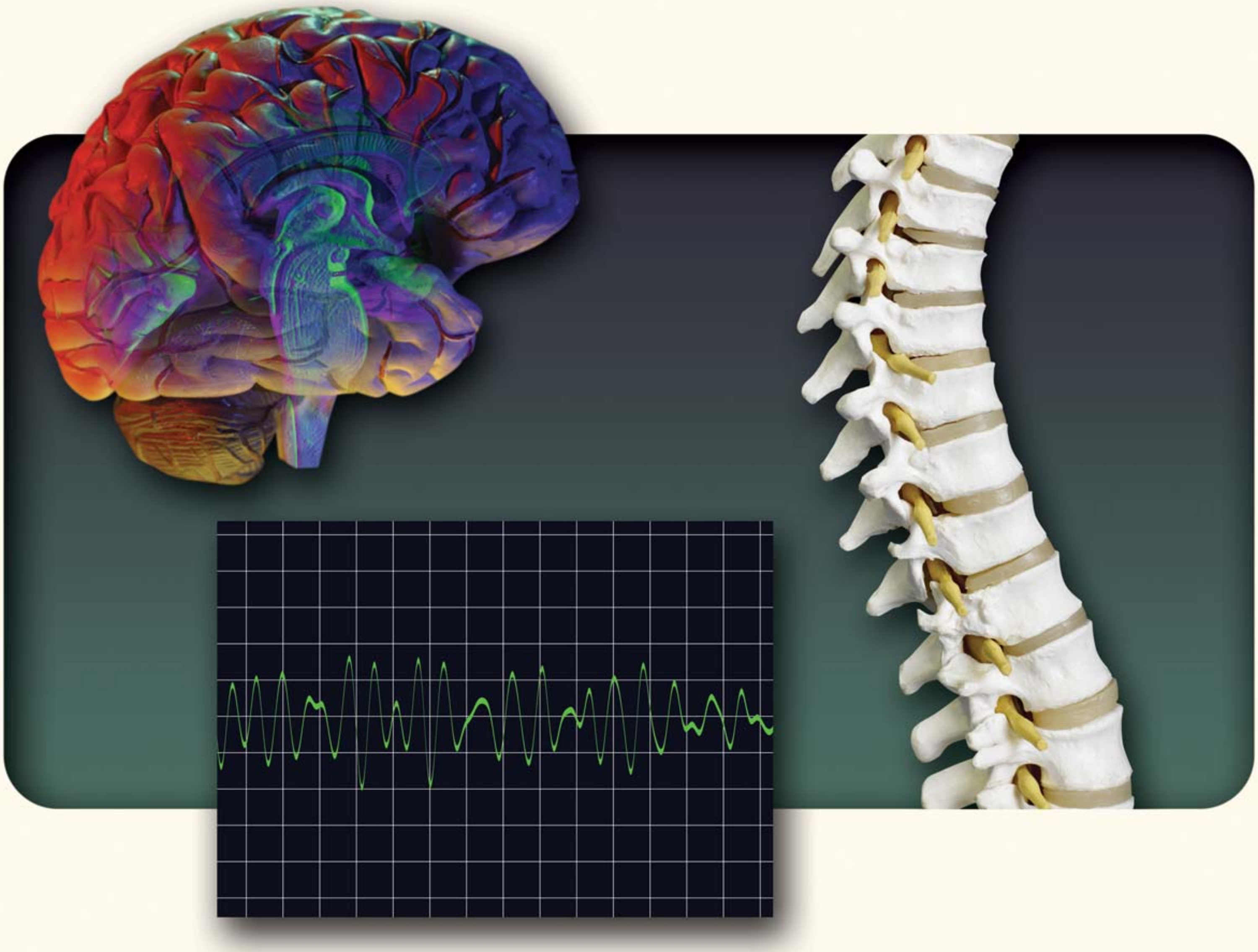
WINTHROP
University Hospital

Progressive Neuroscience

A publication for physicians produced by the **Institute for Neurosciences** at Winthrop-University Hospital



- **Endoscopic Pituitary Surgery**
- **Endovascular Mechanical Embolectomy**
- **Vagus Nerve Stimulation for Epilepsy**

Message from the Chiefs

Michael H. Brisman, MD

Malcolm H. Gottesman, MD

Endoscopic procedures were first performed in the operating room under sterile conditions in the late 1980s. Since then, hundreds of surgeons have advanced minimally invasive surgery for the benefit of our patients.

Beginning in the early 1990s, Winthrop-University Hospital assumed a regional leadership role vis-à-vis endoscopic surgical interventions, performing Long Island's first laparoscopic cholecystectomy. Today, all surgery performed at the Hospital, including neurosurgery, is moving toward minimally invasive, high-tech procedures that lower patient risk and boost outcomes.

The latest neuroendoscopic technology used in **Winthrop's Institute for Neurosciences** is giving our specialists an unprecedented view of the inner structures of the brain and spine so they can assess patients' conditions and operate through tiny incisions. The elimination of large incisions results in reduced blood loss, decreased trauma to tissue, less pain and more rapid recoveries.

This issue of *Progressive Neuroscience* includes several examples of how our experts utilize minimally invasive techniques with exceptional skill and expertise. Featured articles focus on endoscopic pituitary surgery, state-of-the-art endovascular stroke treatment accomplished with the Merci® and Penumbra™ Clot Retrieval Systems, minimally invasive spinal fusion, and pediatric neurosurgeons' use of endoscopic third ventriculostomy as an alternative to shunt placement.

Continuing to reflect the expanding depth and breadth of Winthrop's progressive programs and services, we also highlight the Hospital's comprehensive Epilepsy Program and the use of induced hypothermia in the NeuroICU to rescue brain tissue.

We take great satisfaction in using the most innovative treatment approaches for the full range of disorders and diseases of the nervous system, and consider it a privilege to collaborate with you in the care of your patients.

Michael H. Brisman, MD
Chief, Division of Neurosurgery
Co-Director, Institute for Neurosciences

Malcolm H. Gottesman, MD
Chief, Division of Neurology
Co-Director, Institute for Neurosciences

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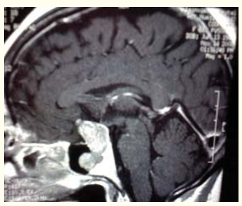

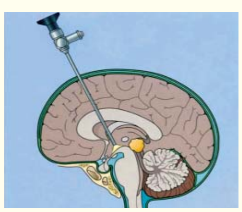

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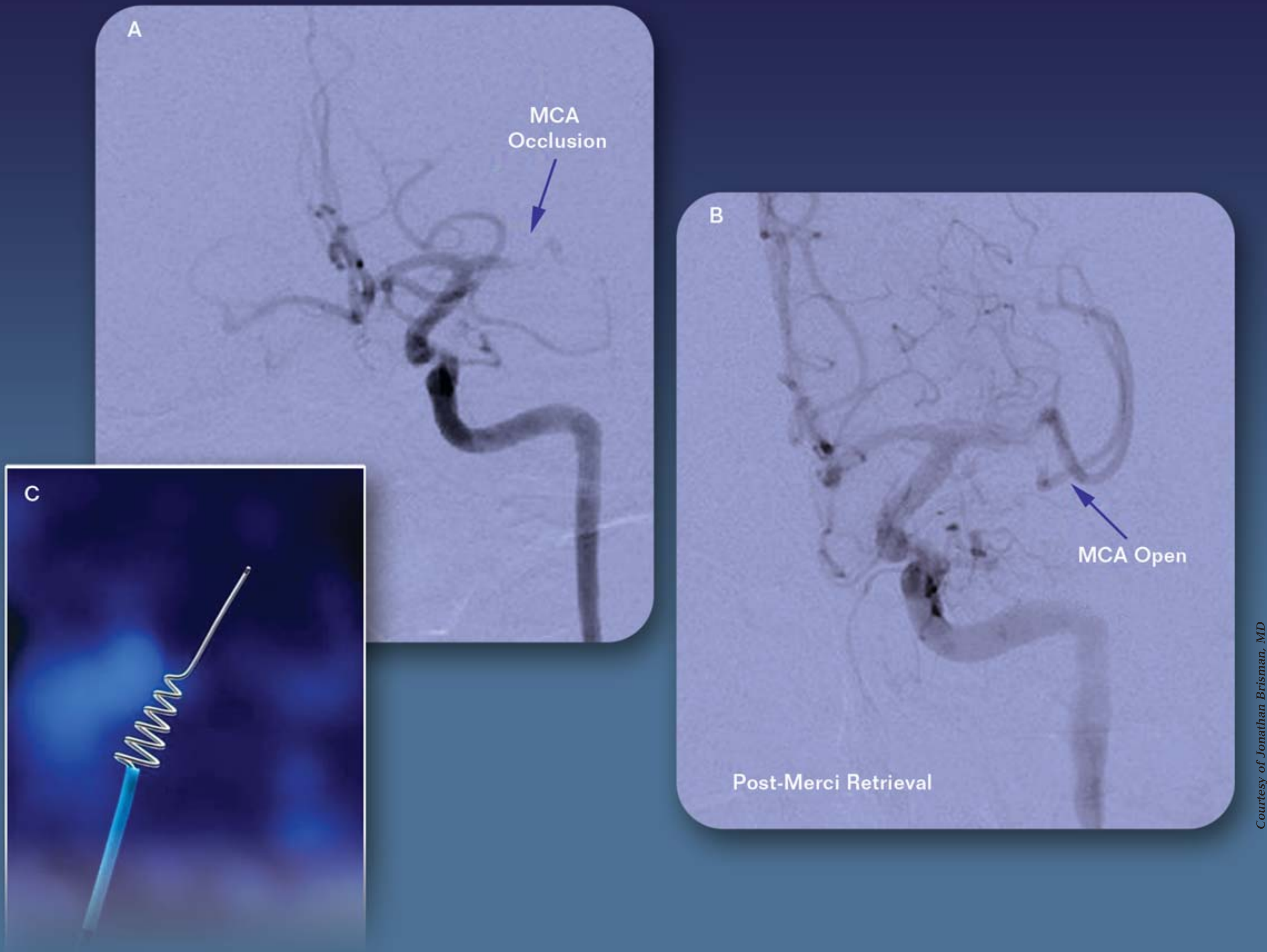


C: Merci Retriever® flexible tapered core wire with Helical loops

Endovascular Mechanical Embolectomy Improves Outlook for Stroke Patients

At 67, Colin Stone* was enjoying retirement, traveling and reaping the unique joy that comes with having nine grandchildren. Then he had a stroke — an acute ischemic stroke that profoundly altered his life.

> **"Too often, by the time a stroke victim arrives at the hospital, the window of opportunity for effective treatment is beginning to close. When a suspected stroke patient comes into the ER, we work like an Indy 500 pit crew to keep that window from shutting."**
>
> Jonathan Brisman, MD
> Director, Cerebrovascular & Endovascular Neurosurgery

While stroke remains America's third leading cause of death and the principal source of serious disability, treatment innovations — including improved imaging technology, modern pharmacology and advanced clot-retrieval techniques — have brought new hope to patients such as Mr. Stone, who arrived at Winthrop-University Hospital's Emergency Department within an hour after experiencing acute right-sided paralysis.

Winthrop is a designated New York State Stroke Center with highly regarded neuroscience specialists and a multidisciplinary Stroke Team that can be mobilized within minutes, 24/7. Since prompt treatment is vital to stroke survival and the degree of recovery, immediate intervention by the Stroke Team and the timely efforts of neurointensivists such as Elzbieta Wirkowski, MD, Mohammed Ibrahim, MD, and Jay Yasen, MD, as well as Jonathan Brisman, MD — one of a select group of neurosurgeons nationwide with dual training in microsurgery and endovascular techniques — were crucial to Mr. Stone's outcome.

"Too often, by the time a stroke victim arrives at the hospital, the window of opportunity for effective treatment is beginning to close," said Dr. Brisman. "When a suspected stroke patient comes into the ER, we work like an Indy 500 pit crew to keep that window from shutting."

With the majority of strokes caused by blood clots, the most effective treatment involves early perfusion to salvage ischemic penumbral tissue, reduce the size of the infarct and increase oxygen delivery to the cells in the affected area in order to limit cell death. "If a stroke is diagnosed and can be treated within three hours of symptom onset — and if the patient is medically suitable — the first line of attack is intravenous administration of tpA [tissue plasminogen activator]," said Dr. Yasen. "But, this clot-busting drug doesn't always achieve recanalization. Sometimes the burden of clot is just too large."

Before waiting to see if tpA would dissolve Mr. Stone's clot, Dr. Yasen anticipated the need for further treatment and alerted Dr. Brisman, who is skilled in device-based therapy. "Endovascular mechanical embolectomy can achieve revascularization in acute ischemic stroke patients when used within eight hours after symptoms appear — particularly in those with late treatment start, IV tpA failure or contraindications for tpA use," explained Dr. Brisman. "Our experience at Winthrop underscores the literature and shows that mechanical therapies can extend the window of treatment time. They are designed to achieve recanalization quickly by extracting stroke-causing occlusions that don't respond to pharmacologic agents.
To improve outcomes, we have moved to a new paradigm whereby, in many cases, we perform percutaneous endovascular mechanical therapy immediately after administering tpA."

Merci® & Penumbra™ Clot Retrieval Systems

According to Dr. Brisman, approximately 20 percent of emergency stroke patients with an otherwise hopeless prognosis benefit from endovascular mechanical embolectomy when applied in the prescribed timeframe. What's more, the procedure obviates the need for an additional intraarterial dose of tpA, thereby reducing the risk of hemorrhage. Depending upon each patient's unique situation and physiology, Dr.

Penumbra™ Clot Separator is advanced in and out of the clot to disrupt it. It is housed in a suctioning microcatheter.

Brisman utilizes either the Merci® or — the newer — Penumbra™ System. Both employ standard catheterization techniques to revascularize large vessels (i.e., the internal carotid, middle cerebral and basilar arteries).

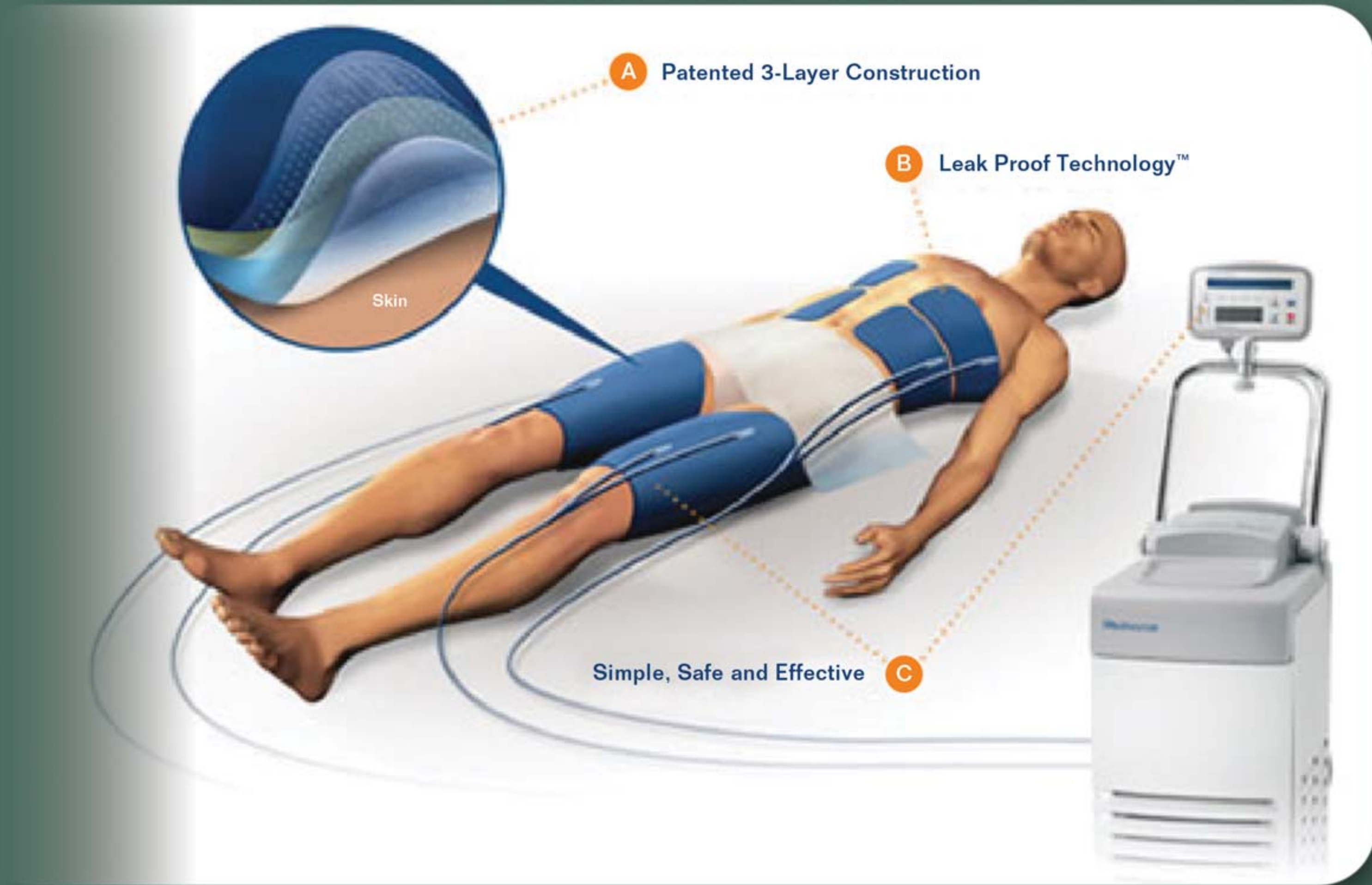
Inserted through a tiny incision in the femoral artery, each system's catheters can be carefully guided via standard angiography to the site of the clot. The Merci® Retriever System deploys a thin, soft coiled wire that acts like a corkscrew to engage, ensnare and remove the obstruction lodged in the blocked brain artery, while the Penumbra™ System consists of an aspiration catheter employing suction to gently grab and aspirate the clot out of the intracranial vessels.

"Our goal is to reperfuse as early as possible and protect penumbral tissue, i.e., tissue at risk for injury, but not yet dead," explained Dr. Yasen. "Since it's not unusual for patients to fail tpA, it's very important to have the option of using these rescue therapies. At Winthrop we not only have the technology, we also have the staff skilled and experienced in the advanced mechanical modalities."

After a computed tomography angiogram (CTA) identified and located a large occlusion in Mr. Stone's left middle cerebral artery, Dr. Brisman elected to use the Merci® System to remove the obstruction; within an hour, circulation to the brain returned. While Mr. Stone remains with some mild neurological motor deficits, he can function independently and considers himself lucky. "I was pretty well out of it," he reported, "but once Dr. Brisman pulled out the clot, I started to come back. I count every blessing. He and Dr.Yasen saved my life."

For more information, call the Institute for Neurosciences at 1-866-NEURO-RX or visit www.winthrop.org.

**Patient's name changed to conform with HIPPA regulations.*



Courtesy of Medivance, Inc.

Induced Hypothermia: Potent Neuroprotectant Boosts Patients' Outcomes

Above: Arctic Sun® temperature management system

After being slammed to the ground by a moving car, 30-year-old Samuel Desmond* suffered a traumatic brain injury (TBI) and remained in a coma for three weeks. He remembers neither the incident nor much about the following year. But, he attributes his survival and a major part of his recovery to the care he received in Winthrop-University Hospital's Neuroscience Intensive Care Unit (NeuroICU).

With patients such as Mr. Desmond — as well as those critically ill with stroke, cardiac arrest and other severe and potentially ruinous conditions affecting the central nervous system — Winthrop's emergency specialists, neurointensivists and neurosurgeons use the latest therapies to rescue, protect and treat the brain. One of the innovative approaches employed to reduce the effects of secondary brain and reperfusion injuries is hypothermia, which was used in Mr. Desmond's case.

"Therapeutic hypothermia may prove to be one of the most significant advancements in brain resuscitation," said Elzbieta Wirkowski, MD, Co-Director of Winthrop's NeuroICU. "It reduces swelling and prevents secondary damage. Many patients with grim prognoses due to severe brain damage are experiencing once-inconceivable recoveries."

While neuroscientists do not yet fully understand exactly how hypothermia protects the brain, it is clear that oxygen deprivation, alone, is not the only factor that precipitates cell death; the massive biochemical, structural and functional insults result from a cascade of reactions triggered by the oxygen deficiency. Since many of these processes are temperature-sensitive, hypothermia can reduce their impact and protect the brain.

Lowering the patient's temperature reduces cellular metabolism — for every drop in body temperature of 1° C, metabolism slows by five-to-seven percent. It also suppresses the breakdown of the blood-brain barrier, reduces free radical formation, eases inflammation and lessens the cytotoxic cascade by making the cell membrane more impermeable. What's more, hypothermia has also been shown to help moderate intracranial pressure, minimizing reperfusion injuries as circulation returns to the brain.

"Therapeutic hypothermia may be considered for patients with TBI, severe cerebrovascular events with increased intracranial pressure and recent cardiac arrest. To be eligible for hypothermia, a patient must be available within 12 hours of the start of the cerebral insult," explained Dr. Wirkowski. "To achieve maximum efficiency, cooling must be initiated within six hours of the patient's arrival in the ER. Our goal is to lower the body's temperature to 32-34° C as quickly as possible — within three-to-four hours — and to keep patients cool for a few days."

To avoid overshooting the targeted temperature, the experts in the NeuroICU adhere to strict protocols and monitor each patient carefully and constantly. They employ medications to minimize the natural shivering response, and remain watchful of potential side effects, such as arrhythmia, decreased clotting ability, increased risk of infection, hypotension and electrolyte imbalance.

Neuroprotective Strategies

Approaches to inducing hypothermia include intravascular cooling and water blankets. The former, an invasive procedure, involves a central venous catheter, which carries cold saline and is threaded through the femoral vein. The device serves as a heat-exchange element, which helps cool the circulating blood. However, while it reduces body temperature rapidly and precisely, this invasive technique has been associated with serious risks, including bleeding, infection, vascular puncture and deep vein thrombosis.

Used more often to lower core body temperature, non-invasive water blankets present much less of a risk. But, this technique is susceptible to leaking, takes longer to achieve the goal temperature and does not include sophisticated temperature management.

Winthrop's NeuroICU utilizes the latest surface therapeutic temperature technique — Arctic Sun®. An advanced, computer-controlled temperature management system, Arctic Sun® combines the best of the more conventional approaches. Coupling the non-invasive benefit of water blankets with the precision and speed of intravascular catheters, the system consists of a main temperature control module connected to thin hydro-gel pads that conform to any body shape. Conventional water blankets trap air between the cooling source and the skin, rendering them far less efficient than the Arctic Sun® Energy Transfer Pads, which are applied directly to the patient's skin and provide direct thermal conduction through the skin.

"Therapeutic hypothermia may prove to be one of the most significant advancements in brain resuscitation. It reduces swelling and prevents secondary damage. Many patients with grim prognoses due to severe brain damage are experiencing once-inconceivable recoveries."

Elzbieta Wirkowski, MD
Co-Director, NeuroICU

"The Arctic Sun® was designed to mimic water immersion," explained Dr. Wirkowski. "It is one of the most effective and efficient ways to quickly lower core body temperature."

By controlling the temperature of the water being pulled through the gel pads, the computerized module lowers the body temperature to the desired level rapidly, at the rate of 1.5° C per hour. What's more, the sophisticated computer algorithm enhances the system's precision, preventing the side effects associated with invasive procedures and allowing for gradual, methodical rewarming without reperfusion injury. "The rewarming phase is critical," Dr. Wirkowski explained. "The literature recommends rewarming slowly, increasing the temperature by 0.5-1.0° C per hour. With our technology, we have great control over the process, which usually takes about eight hours."

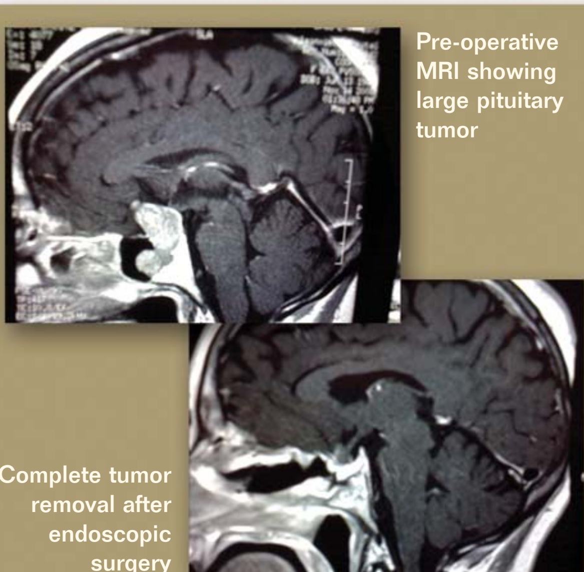
When Mr. Desmond was admitted to the Hospital he had a subdural hematoma, a parietal contusion and a traumatic subarachnoid hemorrhage. "His prognosis was not good," reported Dr. Wirkowski. "The fact that we were able to reduce his body's core temperature quickly not only saved his life, it also contributed greatly to his successful neurological recovery."

Underscoring that conclusion, Mr. Desmond added: "I can drive again, and I'm going back to work soon. I am living proof that hypothermia works."

For more information, call the Institute for Neurosciences at 1-866-NEURO-RX or visit www.winthrop.org.

**Patient's name changed to conform with HIPPA regulations.*

Endoscopic Transsphenoidal Technique Enhances Pituitary Surgery



Pre-operative MRI showing large pituitary tumor

Complete tumor removal after endoscopic surgery

Courtesy of Michael Brisman, MD

While pituitary carcinomas are very rare, benign, slow growing pituitary lesions constitute approximately 20 percent of all intracranial growths. The most common — adenomas — are divided into secretory lesions (approximately 70 percent), which give rise to hormonal disturbances caused by hypersecretion, and non-secretory growths, which do not usually present until reaching a size sufficient enough to cause pituitary dysfunction or compress surrounding neural structures — mainly the optic nerves. When this happens, symptoms can include compromised vision and headaches.

"If diagnosed early enough, prognosis is usually excellent," said Michael Brisman, MD, Winthrop-University Hospital's Chief of Neurosurgery. "Treatment options for symptomatic pituitary tumors are medical, surgical and radiotherapy. The choice depends upon the type and size of the tumor, and whether or not it has invaded or pressed on surrounding structures. In some cases, we use all three options. The main indications for surgery are either uncontrolled symptoms of endocrinologically active tumors, such as those causing acromegaly or Cushing's Disease, or symptoms associated with compression of surrounding anatomy. Our goal is to reduce pressure on nearby structures and/or normalize hormone levels." At Winthrop, Dr. Brisman and otolaryngologist Maseih Moghaddassi, MD, join the former's knowledge of the complex sellar and parasellar region with the latter's expertise in the anatomy of the nose and paranasal sinuses to operate as co-surgeons when excising pituitary tumors. "Optimal pituitary tumor removal has progressed from traditional craniotomy to the transsphenoidal approach with anterior transseptal dissection or less invasive endoscopic endonasal surgery," explained Dr. Brisman. "Using an endoscope with the latest image guidance neuronavigation technology is a safe and effective way to remove even very large tumors."

The small fiberoptic-like endoscope used in the innovative procedure is only 4 mm in diameter with angled lenses and a camera on its tip, which brings the viewing lens close to the work area and provides unparalleled illumination, magnification and high optical resolution of the surgical field; the image is projected onto a video monitor. "The extraordinary visualization even allows us to treat tumors sometimes considered inoperable by traditional surgery," said Dr. Moghaddassi.

Dual-Surgeon Procedure

With their skill and experience, Drs. Brisman and Moghaddassi employed endoscopic surgery to treat 66-year-old Maria Monfort*, whose non-secretory pituitary tumor began affecting her vision. Beginning the dual-surgeon procedure, Dr. Moghaddassi — guided by the video monitor image — carefully threaded the endoscope through the nose into the sphenoid sinus up to the floor of the sella, where the pituitary gland resides. After the endoscope was placed in front of the mass, the vivid panoramic view of the area enabled Dr. Brisman to access, dissect and remove the tumor using special micro-surgical instruments.

"This less invasive alternative to craniotomy or anterior transseptal dissection, is better tolerated by patients and has several benefits," said Dr. Moghaddassi. "Since the point of entry is through the natural pathway of the nostril, there's no need for sublabial incisions. Therefore, there's less swelling and discomfort after surgery. Risk and patient morbidity are reduced, bleeding and post-operative pain are minimized, length of hospital stay is shortened and recovery is easier."

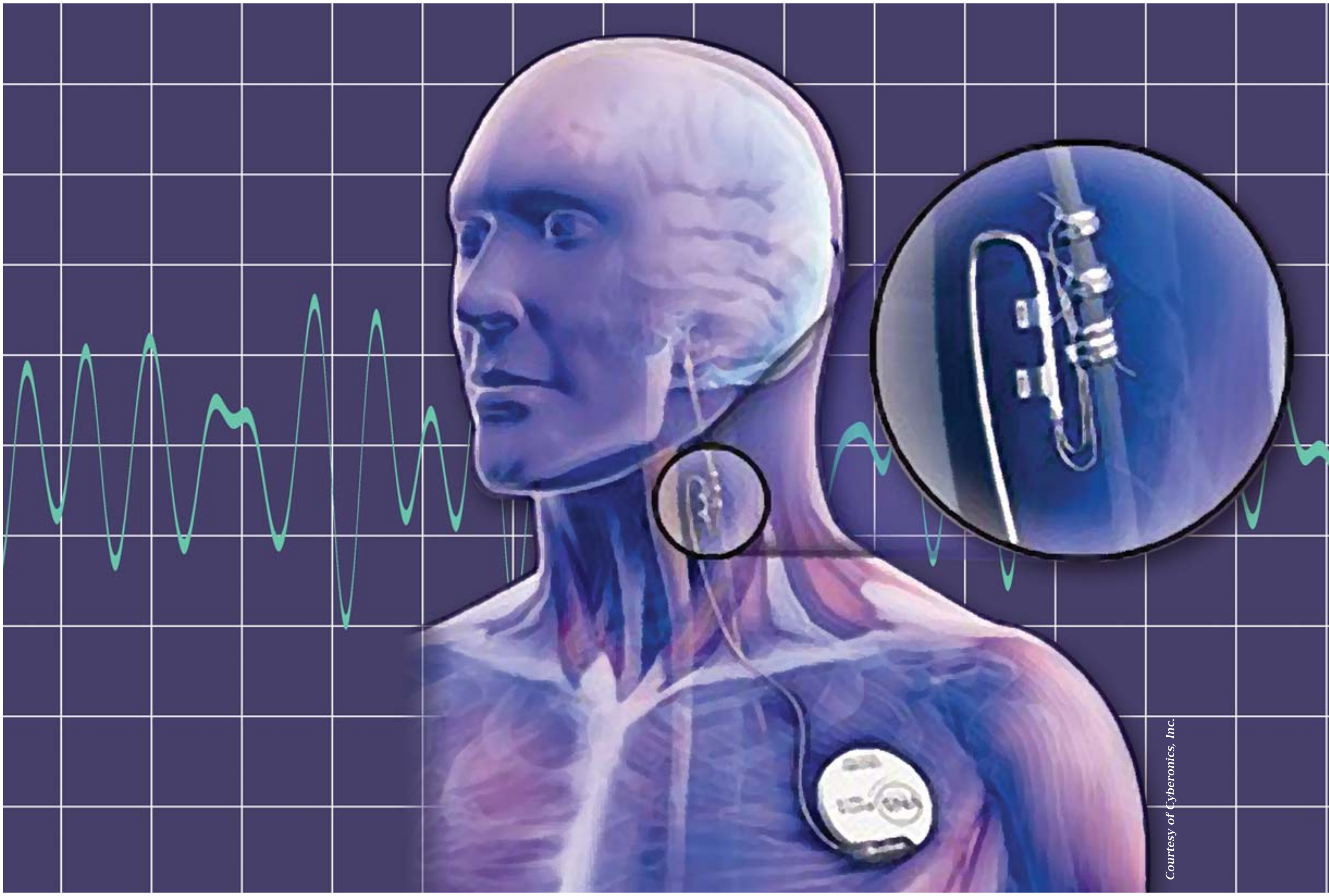
That is exactly what Mrs. Monfort experienced. "I was scared to death," she reported. "But when I woke up, my vision was immediately improved. I felt great. I didn't even have a headache. I'm so grateful to my doctors. They were gentle, thoughtful and kind, but, most important, they got that tumor out."

For more information, call the Institute for Neurosciences at 1-866-NEURO-RX or visit www.winthrop.org.

**Patient's name changed to conform with HIPPA regulations.*

Symptoms Associated with Pituitary Tumors

- Vision changes
- Headache
- Double vision
- Nausea & vomiting
- Dysfunctional pituitary gland
- Fatigue
- Weakness
- Intolerance to cold or heat
- Cushing's Disease with proven elevated ACTH
- Abnormal lactation
- Menstrual irregularity
- Acromegaly
- Gigantism
- Over production of prolactin
- Abnormal thyroid function
- Unintentional weight changes
- Hair changes
- Reduced libido
- Personality changes



The vagus nerve stimulator power pack is implanted near the collar bone and wired to the left vagus nerve.

Comprehensive Epilepsy Program Offers Advanced Treatment Options

Intractable, idiopathic epilepsy laid claim to 33-year-old James Todd* when he was five.

For decades, the frequent, disabling seizures triggered by abnormal electrical discharges in his brain cells, and his medications' debilitating side effects, profoundly diminished the quality of his life. "I never knew when I'd be hit with a convulsion," he said. "I felt sleepy a lot, and I had problems at school. When I got older, I couldn't drive, hold a job for long or play sports. I always felt different."

VNS inhibits seizures by delivering mild, intermittent electrical pulsed signals to the brain via the vagus nerve. The energy stems from a compact, pacemaker-like disc surgically implanted in the left chest, with electrodes tunneled under the skin and wrapped around the vagus nerve.

When his condition deteriorated nearly two years ago, a life-threatening episode sent him to Winthrop-University Hospital's Neuroscience Intensive Care Unit. After recovering sufficiently, he started receiving ongoing treatment from the specialists in the Hospital's comprehensive Epilepsy Program, and gradually his life began to change.

"Epilepsy is a very complex disorder, and each patient's situation is unique," explained Winthrop neurologist Shicong Ye, MD, who directs the Epilepsy Program. "While several types of seizures are easy to control, and many patients are well enough between episodes to lead normal lives,

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approximately 30 percent of the estimated 3 million Americans with epilepsy, suffer with persistent seizures. That's what was happening to Mr. Todd."

Coupling clinical expertise with highly individualized care tailored to each patient's specific circumstance, the Epilepsy Program offers a wide range of advanced neuroimaging techniques and electrodiagnostic services, as well as the latest treatment options, including progressive medical care, intricate surgical procedures and minimally invasive neurostimulation.

Diagnosis & Assessment

While roughly 30 percent of epilepsy cases can be attributed to a range of causes, including head trauma, stroke, birth injuries, brain tumors, metabolic disturbances, developmental abnormalities or infections, the majority are idiopathic. The many different types of seizures are broadly categorized into "generalized" and "partial", depending on their point of origin in the brain, with the former involving the entire brain, and the latter stemming from discreet intracranial areas.

Diagnosis involves an extensive physical examination, complete medical history and detailed description of past seizures. To identify the affected area(s) and accurately assess patients, Winthrop's armamentarium of sophisticated diagnostic technology includes computerized tomography (CT), magnetic resonance imaging (MRI), positron emission tomography (PET), single photon emission computed tomography (SPECT) and conventional electroencephalogram (EEG). In addition, neurologists use specialized sleep-deprived EEG, EEG with photic stimuli and long-term EEG monitoring with video telemetry to record brain activity, as well as classify seizures and pinpoint their origin so that effective treatment plans can be implemented.

"When diagnostic studies are inconclusive or contradictory — and if surgery is being considered — we use subdural strip and grid, as well as depth electrodes to further study epileptogenic foci," said Winthrop neurosurgeon Brian Snyder, MD, who specializes in the surgical treatment of movement disorders and epilepsy. "These implanted electrodes also facilitate intracranial functional mapping to detect the epileptogenic region and its relationship to eloquent cortex, which helps us better understand and limit morbidity if resection is undertaken."

But not every patient is subjected to all these diagnostic procedures. According to Dr. Ye, "We typically move up the assessment 'ladder' in tandem with escalation of potential treatment. That is, a patient with a seizure disorder because of a head injury may have a CT scan, MRI and EEG followed by a course of anti-convulsant medication. If the drugs control the seizures and there are no complications, we usually don't conduct further studies."

Management Options

Anti-epileptic medications are usually the mainstay of treatment. While monotherapy is the goal, and seizures can be controlled with one agent in many patients, polytherapy may be necessary when seizures are refractory.

When even the most aggressive polytherapy cannot control the seizures, or the patient cannot tolerate the medications' side effects, surgery is an option. "Patients with generalized seizures usually are not candidates for resective surgery, while those with partial onset seizures may benefit from resective surgery to remove the epileptic intracranial focus," explained Dr. Snyder.

Minimally Invasive Treatment

For adults like Mr. Todd and adolescents over 12 with partial onset seizures — who do not qualify for conventional neurosurgery or are refractive to anti-epileptic medications — vagus nerve stimulation (VNS) has been shown to reduce the brain's potential to generate abnormal seizure activity. An advanced treatment option offered by specialized epilepsy programs such as Winthrop's, VNS is FDA-approved as an adjunctive therapy to reduce seizure intensity and frequency; it does not involve brain surgery, is mechanically and electrically safe and has been used in more than 50,000 patients worldwide.

VNS inhibits seizures by delivering mild, intermittent electrical pulsed signals to the brain via the vagus nerve. The energy stems from a compact, pacemaker-like disc surgically implanted in the left chest, with electrodes tunneled under the skin and wrapped around the vagus nerve. Once implanted by a neurosurgeon, each patient's device is programmed by a neurologist using non-invasive computer software to deliver a selected "dose" of stimulation automatically, based on patient tolerance and seizure response. Should patients or caregivers sense the start of a seizure, they can activate extra, on-demand stimulation by passing a hand-held magnet over the implanted generator.

"While VNS patients rarely become seizure-free, a significant number experience fewer seizures," reported Dr. Snyder. "In clinical trials, the treatment resulted in median reductions in seizures of 31.3 percent, 40.7 percent and 40.4 percent at one, two and three years respectively." Dr. Ye added: "Alertness, daytime sleepiness, mood and memory have shown improvement in VNS therapy patients. While it is almost always necessary to continue anti-epileptic medication, we can usually reduce the number of medications and the dosages."

Several months ago, Drs. Ye and Snyder initiated VNS therapy for Mr. Todd. He is down to two — instead of three — medications, has returned to work, and is looking forward to driving. Most important, so far, he has been seizure-free. "They gave me back my life," he said.

For more information, call the Institute for Neurosciences at 1-866-NEURO-RX or visit www.winthrop.org.

**Patient's name changed to conform with HIPPA regulations.*

Minimally Invasive Lumbar Spine Fusion: Effective, Safe and Less Traumatic

To chronic back-pain sufferers, the thought of spine surgery is often a cause for significant anxiety. But, with today's sophisticated technology and neurosurgeons' ability to perform minimally invasive procedures to repair serious, disabling spine conditions, opting for surgery need no longer be daunting.

Advanced imaging, tiny cameras and computer-assisted navigational tools, as well as miniature, specially designed instruments, now allow spine specialists to operate with great precision in smaller surgical fields, providing alternatives to conventional spine fusion surgery. The advanced technologies and the development of bone morphogenetic proteins (BMP) to enhance the formation of bony fusion, enable minimally invasive surgery to achieve the same objectives — spinal stability, pain reduction and improved function — as open spine surgery, but with considerably less trauma.

One of the most advanced minimally invasive approaches — transforaminal lumbar interbody fusion (TLIF) — obviates the need for a large midline incision to access the spine. What's more, the procedure greatly reduces the amount of dissected or retracted muscle and tissue.

"The small corridor we create is a far cry from the large incision and soft-tissue exposure necessitated by open surgery."

Artem Vaynman, MD

"We use small incisions, a percutaneous approach and an expandable retractor system," explained Artem Vaynman, MD, a Winthrop-University Hospital neurosurgeon, who specializes in spine surgery and has extensive training and experience in minimally invasive procedures. "The system uses dilators to gently separate the muscles

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surrounding the spine rather than cutting them. That helps preserve surrounding muscular, neural and vascular function."

Indications & Diagnosis

One of the most challenging and crucial aspects of any type of spinal fusion surgery is patient selection. According to Dr. Vaynman, low back pain that limits ability to function, and lasts for more than six months despite extensive non-surgical treatment, is the most general indication for the procedure. "TLIF is ideal for patients with refractory mechanical low-back and radicular pain associated with degenerative disc disease, spinal stenosis, recurrent disc herniation, spinal fractures and spinal instability due to spondylolisthesis," he said. "The typical patient presents with sciatica from a herniated disc. Others have lumbar spinal instability with pain and neurological deficits, including weakness, numbness or loss of function in the lower back, hips and legs."

In addition to having the patient in reasonably good health and motivated to pursue rehabilitation to restore function, finding the specific segment of the spine generating the pain is critical to spinal fusion success. At Winthrop, diagnosis involves a comprehensive physical exam and medical history, as well as X-rays, computed tomography (CT) scans and/or magnetic resonance imaging (MRI). To further pinpoint the source of discogenic pain, a discogram may be performed, and when indicated, a myelogram may be ordered to detect spinal cord pathology; electromyography (EMG) may also be used to help identify neuromuscular abnormalities.

Surgical Technique

Favored when one or two spinal levels are involved, TLIF employs a special expandable retractor inserted through a small (about 2.5 cm) incision in the patient's side approximately 4 cm lateral to the midline; the side of entry depends upon the location of radicular symptoms.

For a patient with degenerative disc disease, Dr. Vaynman consults the diagnostic images that identify the relevant spinal anatomy. Then, guided by fluoroscopy and anatomical images projected onto a video screen, he passes a thin guide wire through the portal. He threads serial dilators over the wire, spreading muscle tissue plains — rather than severing them — to create a surgical channel. "The small corridor we create is a far cry from the large incision and soft-tissue exposure necessitated by open surgery," he explained.

Working through the retractor, Dr. Vaynman removes a segment of bone and the intervertebral disc then cleans the bony walls and inserts an interbody cage into the disc space. Bone graft material — composed either of autologous bone or a genetically engineered substance, such as BMP — is packed around the cage, acting as a scaffold on which new bone can grow.

"At Winthrop, we have achieved very high fusion rates with BMP," he said. "The cage helps restore normal disc height, open up nerve foramina and take pressure off the nerve roots. We also insert pedicle screws and rods percutaneously to stabilize the spine while the treated area heals and fusion occurs. It takes approximately three-to-six months to achieve successful fusion, with complete fusion usually occurring at about one year post-op."

Potential Benefits

In addition to reduced intraoperative blood loss, minimal scarring, less damage to muscles and nerves and diminished post-operative pain, the literature documents several other significant benefits of TLIF, including improved low back pain, resolved radicular pain, reduced post-operative narcotic intake, shortened hospitalization and easier rehabilitation.

TLIF's results (overall fusion rates >90 percent) are comparable to the published results for traditional open spine surgery. "Of course, everyone responds differently," said Dr. Vaynman. "Patients with co-morbidities such as diabetes, or those who smoke, have a lower rate of fusion, but the earlier the diagnosis, the more successful the treatment. Lumbar spine surgery is optimized with TLIF, which is safe and effective when performed by trained and experienced professionals."

For more information, call the Institute for Neurosciences at 1-866-NEURO-RX or visit www.winthrop.org.

Courtesy of Artem Vaynman, MD

Lumbar spine X-rays before (left) and after lumbar fusion using TLIF

Pediatric Neurosurgery: Endoscopic Third Ventriculostomy – Effective Alternative to Shunting

Shock, disbelief and a sense of helplessness overwhelm most parents when they hear their child has hydrocephalus — the most common reason for brain surgery in children. Their feelings are understandable, but advances in technology and treatment protocols are bringing hope to these families, helping more and more youngsters with an excessive amount of cerebrospinal fluid (CSF) lead full, active lives.

At Winthrop-University Hospital, pediatric neurosurgeon Elizabeth Trinidad, MD, an expert in endoscopic brain surgery, uses the latest sophisticated, minimally invasive techniques to treat patients with hydrocephalus, as well as a variety of other conditions, including craniosynostosis, tumors, congenital malformations, epilepsy, trauma and degenerative disease.

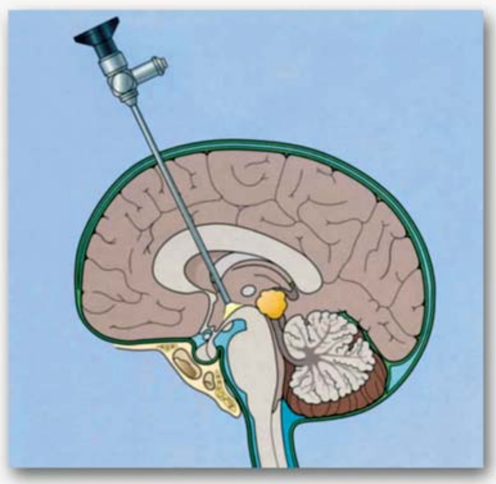
"Although hydrocephalus is not a household word, it is not uncommon," said Dr. Trinidad. "We see the condition in about one or two out of every 1,000 live births. The abnormal accumulation of CSF within the brain can occur for many reasons, but it usually results from an obstruction located in the ventricles. While there's no cure, it's treatable."

Hydrocephalus can be congenital or acquired, with aqueductal stenosis, brain hemorrhaging and in-utero infection the most common causes of the former. The acquired condition is associated with the interaction of environmental and genetic factors, including birth injury, cysts, tumors, blood clots, head trauma or infection.

"Regardless of the cause, the fluid build up that elevates intracranial pressure (ICP) can lead to seizures, motor and behavioral problems, learning disabilities, coma and even death," explained Dr. Trinidad. "While severity differs considerably among individuals, the key to effective care is early detection and treatment."

Specific symptoms depend on the cause of the blockage, the patient's age and the amount of damaged brain tissue. Hydrocephalus is detectable in utero via ultrasound. After birth, symptomatic patients are diagnosed through computed tomography (CT) and magnetic resonance imaging (MRI) scans.

The goal of treatment is to decrease and prevent brain damage by draining the collected CSF to reduce the ICP. While specific treatment depends on the child's gestational age, overall health and medical history, as well as the cause, type and extent of the condition, surgery is usually the treatment of choice. If possible, the obstruction is removed, and the hydrocephalus is resolved. Frequently, however, a direct method is not available to open obstructed CSF pathways, and a bypass — or diversion — must be created to allow for the fluid's normal flow.



Courtesy of Seattle Children's Hospital

With ETV, a hole is made in the membrane of the floor of the third ventricle, allowing the accumulated CSF to bypass the obstruction and circulate normally.

To achieve this, a shunt — the traditional approach to treating hydrocephalus — may be placed in the brain to drain and redirect the extra fluid from the ventricles to another part of the body, such as the abdomen. However, since a shunt is a foreign body, potential complications include infection, bleeding and malfunction, as well as over- or under-draining.

ETV: Popular Alternative

"Generally, over 50 percent of shunts need to be revised within the first year of being inserted," reported Dr. Trinidad, who performs endoscopic third ventriculostomy (ETV) techniques as an alternative to shunting in order to treat obstructive or tumor-related hydrocephalus; remove colloid cysts that can block the foramen of Monroe; and fenestrate loculations, where possible, to help cysts communicate with the ventricles. "With the significant advances in endoscopes, fiberoptic imaging and other specialized instruments, ETV has become a popular, safe and effective alternative to ventricular shunt placement. We aim to treat patients without using shunts, or to simplify the shunt process as much as possible by fenestration of loculated fluid spaces."

ETV, an internal bypass procedure, involves passing a slim-tubed endoscope with a tiny camera at the tip through a tiny burr hole in the skull. The microcamera is connected to a TV monitor that clearly displays the brain as the endoscope is navigated from the top of the skull through the brain to the base of the third ventricle. A small hole in the thin membrane of the ventricle floor allows the accumulated fluid to bypass the obstruction and flow into the subarachnoid space. This establishes normal CSF circulation within the brain and spinal cord.

"The success of ETV depends on patient selection and what caused the hydrocephalus in the first place," explained Dr. Trinidad. "If the patient is chosen carefully, our success rate can be as high as 85 percent. When the cause is an infection or a bleed in the brain, success is about 50 percent."

Once a third ventriculostomy functions and the hydrocephalus is relieved, there's usually no need for further surgery. This compares favorably to the use of shunts, since about 70 percent fail within a 10-year period, with a hydrocephalic child potentially needing five to six shunts inserted before reaching adulthood. What's more, the risk of ETV is low, with few potential side effects. There is no over drainage, no blockage, very little risk of infection, and most important, no implanted foreign material to cause future problems.

For more information, call the Institute for Neurosciences at 1-866-NEURO-RX or visit www.winthrop.org.

Contributing Surgeons & Physicians

Michael H. Brisman, MD
Chief, Division of Neurosurgery
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516.255.9031

Dr. Michael Brisman specializes in stereotactic surgery and radiosurgery for brain tumors and trigeminal neuralgia. He is Board Certified by the American Board of Neurological Surgeons and is a Fellow of the American College of Surgeons. His post-graduate training includes a neurosurgical residency and surgical internship at The Mount Sinai Medical Center in New York, where he was Chief Resident. He received his medical degree from Columbia University's College of Physicians and Surgeons. Dr. Brisman has published numerous articles in professional journals. He is also on the Board of Directors of the New York State Neurosurgical Society and the Nassau County Medical Society.

Jonathan L. Brisman, MD
Director, Cerebrovascular & Endovascular Neurosurgery
516.255.9031

Dr. Jonathan Brisman specializes in cerebrovascular and endovascular surgery for diseases of the central nervous system. As one of fewer than 100 neurosurgeons nationwide with dual training in microneurosurgery and endovascular techniques (and the first on Long Island), he is skilled in aneurysm clipping and endovascular coiling for brain aneurysms, as well as in advanced procedures to treat brain arteriovenous malformations (AVM), carotid stenosis and acute stroke. His post-graduate training includes an Interventional Neuroradiology Fellowship at Roosevelt Hospital in New York and a Microvascular Neurosurgical Fellowship at Swedish Hospital in Seattle. He completed a neurosurgical residency and surgical internship at Massachusetts General Hospital, where he was Chief Neurosurgery Resident. Dr. Brisman received his medical degree from Columbia University's College of Physicians and Surgeons. He has published over 30 articles in peer-reviewed neurosurgery journals, including a recent article entitled "Medical Progress: Cerebral Aneurysms" in the *New England Journal of Medicine* and one on stroke management in *Lancet*.

Malcolm H. Gottesman, MD
Chief, Division of Neurology
Co-Director, Institute for Neurosciences
Director, MS Treatment Program
516.663.4525

Dr. Malcolm Gottesman specializes in the treatment of multiple sclerosis (MS), and is the founder of Winthrop's MS Treatment Program. The program conducts original clinical research and participates in state-of-the-art clinical trials. Dr. Gottesman was instrumental in the establishment of the Stroke Program and Neuroscience Intensive Care Unit at Winthrop. He is Board Certified in Psychiatry and Neurology. His post-graduate training includes a residency in neurology at Long Island Jewish Medical Center, where he was Chief Resident. He also completed an internship and residency in psychiatry at Boston University Medical Center. Dr. Gottesman received his medical degree in an accelerated BS-MR program jointly sponsored by Rensselaer Polytechnic Institute and Albany Medical College. He has published numerous articles in professional journals and presents at national and international conferences. Dr. Gottesman received an MS Leadership award from the Long Island MS Society.

Maseih Moghaddassi, MD
Otolaryngologist
516.294.9363

Dr. Maseih Moghaddassi, an expert in the anatomy of the nose and paranasal sinuses, specializes in the treatment of head and neck tumors. Certified by the American Board of Otolaryngology in Head and Neck Surgery, he is also a Fellow of the American College of Surgeons. His post-graduate training includes a residency in general surgery and a residency in otolaryngology-head and neck surgery at Mr. Sinai Medical Center in Manhattan. Dr. Moghaddassi received his medical degree with research distinction from the Albert Einstein College of Medicine of Yeshiva University, where he was elected to the Alpha Omega Alpha Medical Honor Society. He is the author of several publications dealing with paranasal sinus disease, and has presented at professional meetings.

Brian J. Snyder, MD
Neurosurgeon
516.255.9031

Dr. Brian Snyder specializes in the surgical treatment of movement disorders such as Parkinson's disease, tremor and dystonia, seizure disorders and epilepsy, as well as the surgical management of pain. He is an expert in deep brain stimulation (DBS), utilizing microelectrode recording; procedures for mapping, recording and identifying seizure foci in the brain; the surgical resection of these foci; vagal nerve stimulation (VNS); motor cortex stimulation (MCS); and spinal cord stimulation (SCS). His post-graduate training includes a Fellowship in Stereotactic and Functional Neurosurgery under Dr. Andres Lozano at the Toronto Western Hospital, University of Toronto. He completed a neurological surgery residency and general surgery internship at the Mount Sinai School of Medicine, where he was Chief Neurosurgical Resident. Dr. Snyder received his medical degree from the Temple University School of Medicine. He has published and presented extensively on functional neurosurgery, including works on deep brain stimulation for Parkinson's disease, primary dystonia and depression, as well as stereotactic radiosurgery for tremor and seizure outcomes associated with cavernous malformation.

Elizabeth M. Trinidad, MD
Pediatric Neurosurgeon
516.255.9031

Dr. Elizabeth Trinidad specializes in treating complex disorders of the brain and spine in children. An expert in neuroendoscopy used for tumors, congenital malformations, hydrocephalus, epilepsy, trauma and degenerative disease, she is also skilled in stereotactic radiosurgery for tumors and arteriovenous malformations. Her post-graduate training includes a Fellowship in Pediatric Neurosurgery at the University of Colorado/ The Children's Hospital. Dr. Trinidad completed a neurosurgical residency at the University of Texas, and served as Clinical Research Chiari/Springomyelia Clinical Coordinator at SUNY Health Science Center at Brooklyn. She completed a surgical internship at the University of Connecticut and earned her medical degree from the University of Texas Health Science Center at

San Antonio. Dr. Trinidad has conducted numerous clinical research studies on the use of stereotactic radiosurgery and chemotherapy, as well as clinical drug trials for head injury, bone marrow rescue after high-dose chemotherapy in leukemia and neuropsychological evaluation of children. She has published extensively and presented at many professional meetings.

Artem Vaynman, MD
Neurosurgeon
516.255.9031

Dr. Artem Vaynman specializes in complex spinal surgery, minimally invasive spinal surgery and 3D spinal navigation. He treats a variety of spine problems, including degenerative scoliosis, spinal stenosis, compression fractures, back pain, herniated disc and sciatica. His post-graduate training includes a Fellowship in Complex Spine Surgery at the Cleveland Clinic Foundation; residencies in general surgery and neurosurgery at the New Jersey Medical School, University Hospital in Newark, where he served as Chief Resident in Neurosurgery. He obtained his medical degree at SUNY Downstate College of Medicine in Brooklyn. Dr. Vaynman has authored "Spinal Cord Injury and Paralysis" a chapter in *Essentials of Orthopedic Surgery: Spine*.

Elzbieta Wirkowski, MD
Director, Cerebrovascular Disorders and Stroke Program
Co-Director, Neuroscience Intensive Care Unit
516.663.4525

Dr. Elzbieta Wirkowski specializes in cerebrovascular neurology and neurocritical care. She is Board Certified in Neurology, Vascular Neurology and Neurocritical Care. Her post-graduate training includes a Cerebrovascular Fellowship at Long Island Jewish Medical Center (LIJ), where she participated in multiple research trials dealing with neurocritical and cerebrovascular problems. She also completed a residency and internship in neurology at LIJ. Dr. Wirkowski earned her medical degree with honors from Warsaw University in Poland, where she also studied molecular biology. She is the author of many publications dealing with neurocritical care and stroke, and presents regularly at national and international meetings.

Jay Yasen, MD
Associate Director, Cerebrovascular Disorders
Director, Neurovascular Laboratory
516.663.4525

Dr. Jay Yasen is a critical care/stroke neurologist whose areas of interest include acute stroke management and cerebral venous thrombosis. He joined Winthrop from Montefiore Medical Center, where he served as Director of Stroke Service for more than six years. Dr. Yasen is Board Certified in Neurology and is a Diplomate in the subspecialty of Vascular Neurology. His post-graduate training includes a Fellowship in Stroke and Neurocritical Care at Beth Israel Medical Center in Manhattan. He completed a residency in neurology at the Albert Einstein College of Medicine and an internal medicine internship at Columbia Presbyterian Medical Center, and earned his medical degree from the Albert Einstein College of Medicine. Dr. Yasen has conducted research into the prevention of second strokes and has authored several publications dealing with stroke.

Shicong Ye, MD
Neurologist
516.663.4525

Dr. Shicong Ye specializes in evaluating and treating patients with epilepsy. He has a special interest in treating refractory seizure patients with vagus nerve stimulation and surgery. Dr. Ye is Board Certified in Neurology. His post-graduate training includes a Fellowship in EEG/Epilepsy at Long Island Jewish Medical Center. He completed a neurology residency at Long Island Jewish Medical Center, where he was a Chief Resident, and an internship at Kingsbrook Jewish Medical Center. Dr. Ye completed an honorary medical degree from the prestigious Shanghai Medical University in China. He has been a primary investigator in several epilepsy clinical trials and co-investigator in many other trials.

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Winthrop-University Hospital's Institute for Neurosciences

Winthrop-University Hospital is a 591-bed teaching hospital located on Long Island in Mineola, NY. A major regional healthcare resource, the Hospital has been a leading healthcare provider for more than a century, dedicated to the integrity, dignity and well-being of every individual. Winthrop offers a full complement of advanced inpatient and outpatient services with a deep commitment to medical education and research.

Physicians and surgeons in **Winthrop's Institute for Neurosciences** are pioneering the use of technologically advanced approaches for the diagnosis and treatment of diseases of the brain and spine, including computerized imaging systems, state-of-the-art surgical interventions and the latest generation of medication therapies.

The Institute's interdisciplinary team includes neurologists; neurosurgeons; neuro-intensivists; pediatric neurologists and neurosurgeons; neuroradiologists; vascular surgeons; orthopaedic spine surgeons; neuro-oncologists; neuropathologists; neurophysiologists; and specially trained nurse practitioners, physician assistants and nurses. Specialized physical and occupational therapy, social work and other supportive services are also key components of the Institute. The Institute's experts are up to date on the latest developments in neuroscience and help pave the way for new discoveries through participation in clinical research trials, which enable them to provide patients with access to tomorrow's most promising therapies.

Programs & Services Offered by the Institute for Neurosciences

Neuroscience Intensive Care Unit

The 14-bed acute care unit reserved for patients with serious, complex neurological issues. The focus is on providing continuous monitoring and instantaneous results of critical values, allowing the expert staff, experienced in using advanced technology and providing neurocritical care, to employ aggressive interventions that treat neurological deterioration.

Neurology

Epilepsy Program
Movement Disorders Program
Multiple Sclerosis Treatment Center
Neuromuscular/Peripheral Neuropathy Program
NYS Designated Stroke Center with AHA and ASA "Gold" Level Status

Neurosurgery

3D Spinal Navigation
Aneurysm Coiling & Clipping
Disc Replacement
Brain Aneurysm Program
Brain Tumor Program
Brain & Skull Base Surgery
Carotid Stenting & Endarterectomy
Cerebrovascular & Endovascular Surgery
Complex & Minimally Invasive Spinal Surgeries
Complex Cranial Surgery
Computer-Assisted Resection of Brain Tumors
CyberKnife® Radiosurgery
Endoscopic Pituitary Surgery
Epilepsy Surgery Program
Facial Pain/Trigeminal Neuralgia Program
Image-Guided Spine Surgery
Kyphoplasty
Microdiscectomy
Microneurosurgical Techniques
Microvascular Decompression for Trigeminal Neuralgia
Neuro-oncology
Neuropathology
Parkinson's Disease Surgery Program
Pediatric Neurosurgery
Posterior Lumbar Interbody Fusion
Prestige® Cervical Disc
Programmable Shunt Placement
Spinal Stimulation
Stereotactic Radiosurgery
Traumatic Brain & Spine Injury Diagnosis & Treatment
X-Stop® for Spinal Stenosis

Neuroradiology

Aneurysm Treatment
CT Perfusion Scanning
Interventional Neuroradiology
Neuroangiography
Neuro Diagnostic Lab
Positron Emission Tomography (PET) Scanning
Ultrafast Computed Tomography (CT) & Magnetic Resonance Imaging (MRI)

Pediatric Neurology

Attention Disorders & Learning Disabilities Treatment
Brain Tumor Treatment
Evaluation & Treatment of Children with Headaches
Evaluation & Treatment of Neurological Disorders
Neuro Developmental Screening & Early Intervention
Pediatric Intensive Care Unit
Seizure Disorders Management
Treatment for Hydrocephalus & Other CNS Anomalies

For more information, call the Institute for Neurosciences at 1-866-NEURO-RX.