

Bringing Neurosurgical Access to Rural Sub-Saharan Africa: A Second Opinion

Bert E. Park, MD*

Tenwek Hospital, Pan African Association of Christian Surgeons (PAACS), 1902 Springhill Ave. Mobile, Alabama 36607, USA

***Corresponding Author:** Bert E. Park, MD, Tenwek Hospital, Pan African Association of Christian Surgeons (PAACS), 1902 Springhill Ave. Mobile, Alabama 36607, USA, E-mail: bertandvickipark@sbcglobal.net

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During a 2014 Bethune Round Table conference held in Hamilton, Ontario, an American neurosurgeon seems to have injected a sense of therapeutic nihilism into sub-Saharan Africa's lack of access to neurosurgical care. Based upon his own four-year pediatric experience at Bethany Childrens' Hospital in Kijabe, Kenya, he apparently has come to believe it "inappropriate" to train general surgeons in rural and provincial hospitals to do basic neurosurgical procedures. Moreover, citing a lack of resources and "interested manpower", he advocated leaving the future extension of neurosurgery into underserved areas to what few indigenous neurosurgeons there are in the cities (!).

As a neurosurgeon myself who has undertaken more than 40 working trips over the past 15 years to Kenya, Uganda and Rwanda - and continues to share in the training of general surgery residents in the Pan African Academy of Christian Surgeons (PAACS) program at Tenwek Hospital in rural Bomet, Kenya - may I respectfully say that I could not disagree more with my esteemed colleague's opinions? Nor am I just a lone voice crying out in the wilderness. When this issue regarding the lack of access to neurosurgical care in rural areas was first addressed in the literature as far back as 2001, a published survey among African neurosurgeons identified (and I quote) "the training of general surgeons to perform basic...neurosurgical procedures" as the first priority, and that such training "be done locally" (all emphases mine).

Indeed, this is what myself and four other American neurosurgeons have been doing over the past 6 years at Tenwek. The fruits of that labor to date are at least eight (8) PAACS general surgery residents who now feel comfortable taking on these "basic" neurosurgical cases (including by far the most common and readily reversible malady the Bethune presenter ignored, that being degenerative spine disease). The perceived value here is that these trainees must "give back" one year of service in rural areas for every year (5) of training, during which period they can pass along their experience and skills to others.

Hence, the impetus for this "second opinion" of sorts. My own experience doing and teaching neurosurgery in rural Africa dispels virtually all of the alleged "obstacles" the Bethune presenter listed as justification for, in effect, letting the Africans handle their own problems.

(1) As regards his claim that CT on-site is "required" for diagnosis so as to appropriately treat intracranial hematomas, hydrocephalus, compound depressed skull fractures, and brain abscesses, only the last truly requires such imaging—and that only if excision of such an abscess is mandated in the face of (1) failure of empiric I.V. drug therapy, and (2) life-threatening mass effect. In such an extenuating circumstance, there are any number of outpatient CTs spread around Kenya itself to which a patient can be sent and then return for definitive surgery.

- (2) As for the burgeoning pediatric population in sub-Saharan Africa victimized by hydrocephalus (with or without open/closed spinal defects), most can be diagnosed with ultrasound while the fontanelles are still open. And again, in the complicated case or older age group, outpatient CT or even MRI are still options. Should an overt obstructive hydrocephalus be identified (and in our experience any good ultrasound technician can identify such in infants), then the patient can be transported to a center like Kijabe where endoscopic third ventriculostomies are routinely performed.

Having said that, virtually all ventriculo-peritoneal shunts for the communicating variety are performed at Tenwek by general surgery residents, with complications and infections no greater than I witnessed at Kijabe while working there for four years from 2000-2004.

- (3) Regarding intracranial hematomas, the recent literature now supports not evacuating intracerebral bleeds except in cases of life-threatening mass effect. For patients presenting with lateralizing signs and decreased level of consciousness - whether spontaneous or traumatically induced - most can still be managed appropriately with judicious hyperosmolar therapy and ICP monitoring alone, irrespective of making a precise diagnosis that CT affords.

(This is where gaining intraventricular access through twist drill or burr hole at Kocher's point often comes into play - the same reference point the general surgeon uses for standard VP shunt placement. After placing the catheter for monitoring, 2ccs of air can be carefully injected and a good AP film taken intraoperatively to assess for any substantial shift that might dictate more aggressive management such as performing a wide decompressive craniectomy, which our Tenwek general surgery residents have been trained to do).

With respect to extra-axial hemorrhage (i.e., epidurals/subdurals, whether acute or chronic), our experience is that a thorough history and neurologic evaluation followed by standard exploratory burr holes determines subsequent treatment in over 90% of cases. Should an acute epidural or subdural be uncovered with burr-hole exploration, the holes are simply converted into a craniotomy "trauma flap" and the hematoma evacuated. (If negative, an ICP monitor is placed through the frontal burr hole and attached to a manometer with a 3-way stopcock secured on an I.V. pole at the ear level).

On the other hand, if the brain rapidly expands to fill the subdural space--such as often occurs in the severe closed head injury case accompanying an acute extra-axial hemorrhage--our general surgery residents leave the bone flap out, secure it in an abdominal pouch for later replacement, and a duraplasty with parallel slits is fashioned.

Though Tenwek was the first of rural mission hospitals in Kenya to have the luxury of a CT, most assuredly that is not required to appropriately address a compound depressed skull fracture (with or without a dural tear), as any experienced general surgeon knows. Nor is CT necessary even now to manage the wealth of traumatic intracranial pathology we see - notwithstanding the Bethune presenter's inexplicable claim that such trauma is "infrequent enough" so as to preclude enough clinical experience in learning how to manage this entity(!). Leading me to wonder: Are we working in the same country?

My own suspicion, based upon 20 years of experience in 24 underdeveloped countries, is that the real reason most intracranial hematomas go undetected (particularly the subacute and chronic varieties) is that the clinician is either not looking for them to begin with, or invoking the all-too-familiar rubric of having neither "a CT to diagnose" nor "the ability to treat" such a condition once found.

- (4) That same sort of thinking, unfortunately, applies to the far greater prevalence of degenerative spine disease afflicting the African population no less than in any other nation, race, or culture. What's more, the failure to return these patients to gainful employment or domestic duties has huge socio-economic consequences in sub-Saharan Africa.

Making the diagnosis begins with a good basic history and physical examination that any physician can do, followed by the cheapest and most expeditious test to confirm one's clinical suspicion of the need for surgery. I'm referring to "old-fashion" myelography using non-ionic water soluble contrast per a simple lumbar puncture, followed by 3 plain films at most, costing the patient roughly \$30 US as opposed to MRI studies at more than four times the expense (assuming the latter is even available) [1].

This modality has transformed what we see and treat at Tenwek - as it should for any rural or provincial hospital that has a general surgeon who has been afforded some hands-on training in basic laminectomy procedures.

Nor does that need to be a lengthy “time-served” (as opposed to our “competence-based”) curriculum, assuming the general surgeon is allowed to do the surgery under operative supervision. Using the tried and true mantra of “see one, do one, teach one”, on average at Tenwek our residents perform from 10-12 such hands-on procedures during a given two-week block of instruction - which, it should be noted, is roughly the same number that most first-year neurosurgery residents do in their own training before becoming “instructors” themselves for the next year’s understudies.

More to the point, our residents’ results compare favorably with my own. Fully 92% of all such patients undergoing straight-forward decompressive laminectomies for spinal stenosis or hemilaminectomies for disc herniations return to normal activities of daily living and/or gainful employment within one month, and with less than 2% morbidity, as a recent comparative study of our results demonstrates [2].

The bottom line: none of these procedures, whether intracranial or spinal, constitute “delicate” surgery reserved for sub-specialists. All can be safely and expeditiously performed by general surgeons who have had benefit of a minimum of hands-on exposure. The track record at Tenwek affirms such - with scores of lives saved and hundreds transformed, who otherwise (and heretofore) have been relegated to the dust bin of therapeutic nihilism referred to in my introductory comments.

Which brings me to the one legitimate obstacle as I’ve experienced it while doing and teaching neurosurgery in rural/provincial hospitals of underdeveloped countries in general and sub-Saharan Africa in particular: the post-operative bedside neurologic assessment and respiratory care of patients in the ICU setting who have undergone intracranial procedures or suffered severe closed head injuries. Doing the procedure (whether by a neuro or general surgeon) is not the problem; managing the patient postoperatively from the nursing perspective most assuredly is. Unless repeated in-servicing is done and a system maintained whereby a single well-trained nurse is in charge of reinforcing such teaching (particularly with respect to patients experiencing a decreased level of consciousness), otherwise avoidable complications arise more often than they should.

That’s the real challenge. But what’s the alternative as it now exists for instance in, say, Kenya? Send the patient with a life-or-limb-threatening condition (and no money) to Kenyatta National Hospital? That’s some four hours away [from Tenwek], assuming he or she

should even be transported over pot-holed roads - only to then be bedded down in a government hospital that affords its neurosurgical staff but two days/week for “elective” cases! My own 15-year experience in Kenya has confirmed time and again that this is the least constructive alternative for the patient’s well-being - particularly for those with limited financial resources, which constitutes well over 90% of the population.

One final - and major - objection I have to my colleague’s take on why (and I quote) “it’s probably not appropriate to try to develop neurosurgery in sub-Saharan Africa”. Reading between the lines (if not the lines themselves!), all that seems to matter is the urban Kenyan surgeon’s view of whether to expand neurosurgical access to rural/provincial areas - as opposed to what their real mandate should be: making it happen for the good of the poor and dispossessed. Allegedly speaking for these neurosurgeons, consider the following assertions that appear in his Bethune Round Table presentation (Note: all question marks, exclamations, and emphases are mine):

“Neurosurgical patients are often disabled, and disabled people are not valued in their society”;

“Most neurosurgeons prefer not to treat disabled people”;

“Neurosurgery training programs have little interest in training general surgeons or treating their complications”;

“There is minimal evidence that African [general] surgeons want such training”(!);

“Training a surgeon [in neurotrauma] would take a minimum of 1 year and ideally 2 years because these cases are so infrequent”(?!).

With all due respect, such thinking reflects not only the harsh reality of protecting one’s professional turf, but the stark unreality of the proverbial ostrich with head-in-sand....

Perhaps a single-sentence email I once received out of the blue from the Bethune presenter will serve to underscore my point: “Just what do you mean by teaching ‘good basic neurosurgery’ [read: to those outside our hallowed area of expertise]?”

Sensing a potential conflict by its very tenor, I ignored his shot across my bow and chose at the time to row to my adversary with muffled oars.

Yet my thinking then was no different than what it is now: teaching general surgeons “good basic neurosurgery” is not a chimera; it’s a mandate for the benefit of those who labor in the trenches of rural and provincial hospitals.

Why? Simply because their patients otherwise have no access to neurosurgical care that urban dwellers in sub-Saharan Africa (with money) take for granted.

What we are advocating - and would add to the “system” - is this: not more money; not more CTs; and certainly not more neurosurgeons with fellowship credentials who invariably return to lucrative practices in the city. Rather, I’m merely suggesting adding a bit more knowledge and a few more technical skills to the rural/provincial general surgeon’s armamentarium.

To be sure, he or she already has a “plate-full” (and perhaps just as relevant - or so I’m told - “no O.R. space” to accommodate such an added surgical burden). And I don’t mind admitting that I’ve come face to face with the latter “obstacle” through frustrating experience within the very organization to which I volunteer my time pro bono. Yet the truth of the matter is, lumpectomies, hernias, wound wash-outs, and skin grafts that fill their schedules are elective, whereas most “basic” neurosurgical cases cannot be put off, much less ignored, as is currently being done.

In a word, the term “general” in surgery implies the ability to treat a large variety of disease processes. And by prevalence alone, pathology of the brain (and moreso the spine) is right at the top of the list.

So am I advocating that general surgeons excise large or deeply seated tumors? Not at all! There is always time to refer those patients to an urban center - assuming they can afford the neurosurgeon’s \$5,000 US fee alone up front.

Yet an even sadder reality remains: when operated there (just as in the best neurosurgical centers in the United

States), many such patients never return to an independent, self-sustaining existence, much less gainful employment. And given the absence of a social safety-net in Africa, that’s a tragedy for all concerned.

In this one sense alone, then, my esteemed colleague got it right: “Disabled people are not valued in their society”.

Granted, there are quite simply no easy answers here. Nor is neurosurgical disease sub-Saharan Africa’s greatest health-care concern; HIV, malaria, and clean water most assuredly are. Yet as surgeons of whatever “stripe”, this is still the God-given gift - and mandate - we’ve been bequeathed. And it’s the very least we can do to fulfill His claim on our lives.

To propose, therefore, that any attempt to develop neurosurgery in sub-Saharan Africa meets with so many “obstacles” that we best leave that to the “system” as it now functions is not only wide of the mark but disingenuous. The need is there, and can be met. The time has come (and the clock’s continued to tick for the last 10 years) to get neurosurgical “boots” on the ground in rural Africa, bearing the footprints of adequately trained general surgeons.

It’s already being done at Tenwek. The concept bears a “second look” elsewhere - as do “second (and third) opinions” in favor or opposed to that. So let the collegial discussion begin!

References

1. Park BE: Myelography as a Stand-Alone Diagnostic Procedure for Degenerative Spine Disease in Developing Nations. *World Neurosurgery* 75:1; January 2011.
2. Park BE: Surgical Treatment of Degenerative Lumbar Spine Disease in Rural Africa: A Fifteen-Year Retrospective of 450 Cases and Future Implications. *World Neurosurgery*; December, 2015.

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