Proximal Femoral Fractures
A Perspective from Developing Countries

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The approach to hip fractures in the developing world has been reviewed to give perspective to the problem on a larger scale. Hip fracture treatment in the developing world is a paradigm for treatment of other orthopedic problems as well as for medical care in general. The most successful approach has been to use the resources as sparingly as possible so as to provide care for the greatest number of people. Reliance on simpler, more basic techniques of nonoperative treatment reduces the complication rate and seems to provide a safer, more cost-effective approach, but the nonunion rate may be 30%–70%. The situation in which technical development exceeds resources is not unique to the developing world, although it is perhaps more apparent there because of a lower resource level. The “developed” world faces the same dilemma, the only real difference perhaps being a higher minimum. Probably no society today can provide the medical care it is technically capable of producing for all of its members. When viewed from a world-wide scale, the task of providing high-technology medical care seems daunting indeed. Development of more sophisticated, expensive technology may not be the appropriate direction; a more fundamental or preventive approach might in the long run be the most effective.

“The main difference from the past will be that in some way the whole world will be included . . .”

Margaret Mead
World Enough 1975

As new and more predictive methods of treating fractures of the proximal femur are devised, treatment complexity and expense are increased. While newer methods such as vascular grafts, sliding compression screws, bipolar endoprostheses, and operative fluoroscopy have become commonplace in isolated locations, there remains a large portion of the world population to which these procedures are not accessible. Treatment of these often difficult fractures must then be accomplished by available, affordable means. Medical care in these areas, often called the developing countries, is not homogenous, ranging from tribal tent to large cosmopolitan hospital.

In areas where only traditional medicine is practiced, methods may date back centuries and include such things as rest, mudpacks, herbs, and massage (Fig. 1). These are usually culturally accepted methods that may be efficacious for that population and are very slow to change. In other areas, cosmopolitan medicine is similar to that practiced in most parts of the Western world. Between these extremes are areas in which various mixtures of traditional and scientific medicine are practiced, usually by scientifically trained personnel with
FIGS. 1A AND 1B. (A) AP and (B) lateral view of right hip. A 38-year-old man fractured his right femur in a fall from a tree. Because medical care was unavailable, he treated his intertrochanteric fracture with recumbency. His femur is short and externally rotated but he is ambulatory with minimal pain.
inadequate facilities, equipment, and medicine. This article focuses on that segment of the world population. It is difficult to estimate this population accurately, but it may represent as much as three-fourths of the world’s total population.

Hip fracture care is but a fragment of the total medical system of any culture, but is representative of the difficult problems encountered and the innovative solutions devised in the developing countries represented. Most of what follows is based on impressions of the authors’ collective experience. In some cases, this involves many years of experience in a particular locality, but it is not meant to be comprehensive of the entire third world.

**FEMORAL NECK FRACTURES**

The incidence of femoral neck fractures in this population is not well known but is estimated to be somewhat less than that seen in the developed countries. This perhaps is secondary to a more active lifestyle and the decreased average age of the population. Nonunion and avascular necrosis, the well-known complications of femoral neck fractures, prevail the world over. The systemic complications of pneumonia and thrombophlebitis have a low incidence perhaps because many of these patients present late for care, having already survived these earlier life-threatening conditions.

Nonoperative treatment is commonly used in areas of limited resources or unsafe surgical facilities. Closed reduction and application of a single hip spica plaster with the knee in flexion has been successful. The complication rate has been low and some patients can be ambulatory in a manner of days. This method was described by several authors in the English literature with results ranging from a 30% to 70% union rate.5,10

Surgical treatment is carried out with a variety of internal fixation devices, including the Smith-Petersen triflanged nail, Knowles pins, or threaded Steinmann pins. Telescoping nails or compression screws are generally not available. In most areas surgical procedures are done without roentgenographic control. A lateral incision, which can be extended anteriorly to allow direct inspection of the head and neck region during pin placement, is necessary.

Uncomplicated procedures are indicated in areas where surgical facilities are not ideal. Displacement osteotomy used for nonunion of the femoral neck fracture can be done blindly through a small incision allowing the distal femur to displace medially. In young people who obtain a successful union following a McMurray osteotomy, the results have been excellent. If the fracture does not unite after this procedure, the patient usually ends up with a painful hip and is rarely able to ambulate without crutches. The complications of nonunion and avascular necrosis are also treated by excisional arthroplasty, but the results seem inferior to those following its use as a primary procedure.

Prosthetic replacement is not often performed because of the nonavailability of implants and the complications of this more extensive surgery. Infection and a decreased range of hip motion are common. In societies requiring squatting or kneeling as part of their culture such loss of motion is socially unacceptable. Excision arthroplasty (Girdlestone procedure) in such cases seems more reliable and better tolerated. This operation is perhaps somewhat maligned in the more developed countries, but it has given excellent results in some less developed areas of the world.3,11 Experience indicates that postoperative traction does not affect the results significantly. Patients have several inches of shortening, walk with a limp, and require a built-up shoe, but can walk one to two miles relatively pain-free and can enter a deep squat necessary for social customs. In some areas femoral prostheses are still made locally from ivory with the expected results. The use of total hip arthroplasty probably has no place in the population considered here. With the current state of technology, the expense and complication rates are prohibitive.

It is not uncommon in underdeveloped countries to see patients with fractures of the neck of the femur admitted to hospitals with
the intention of performing a surgical fixation. The patient often lies neglected and idle for weeks before it is decided that he or she is too old or frail, that there are no pins available, or that there is just too much else to do. The patient is discharged with stiff knee, maybe a heel sore, in worse condition than before admission. If the patient does get to the operating room, the surgical result is often far inferior to that prevailing in developed countries.

These facts must be recognized from the moment of diagnosis and rehabilitation started immediately i.e., assisted walking. A nonunion of a femoral neck fracture in a patient who has maintained activity, with normal nutrition and function of the limb, is an acceptable result in a large part of the world.

PERITROCHANTERIC FRACTURES

Peritrochanteric fractures are usually approached in a manner similar to femoral neck fractures but, having a lower complication rate, seem to do better. The treatment methods are varied and more interesting in this group of fractures. Nonoperative treatment is done with plaster, as described previously for femoral neck fractures, and by various forms of traction. Two to three months seems to be a satisfactory length of time to allow fracture healing in this population.

Modified Russell’s traction and skeletal traction with a tibial pin are almost universally used. Traction accompanied by a plaster antetorsion boot (Fig. 2) has been successful in maintaining the proper alignment during the healing process and precludes the need for overhead frames and slings. The expense of plaster at times may prohibit its use. Roentgenograms are usually scarce and periodic leg length measurements are used to direct traction adjustments. This method has the advantage of being usable in areas where hospital beds are not available and is safe, reliable, and inexpensive.

The use of roller traction as described by Mays and Neufeld 7 has proved to be a safe and effective method of treating femoral shaft fractures world wide. 1,2,9 Its use for intertrochanteric and subtrochanteric fractures is less well known but has also proved effective. 1,4,6 It has the advantage of allowing early ambulation and less hospital time. The equipment can be fashioned from local materials, but does require a bed with an overhead frame (Fig. 3).

Operative treatment of peritrochanteric fractures is fraught with the same difficulties as that of femoral neck fractures. The results of good closed treatment are superior to results of poor surgical treatment with the possibilities for loss of fixation, varus deformity, or infection. Stabilization is accomplished with locally made or donated devices, which often must
be altered. Jewett nails are commonly used, while compression screws or sliding nails are usually not available. Subtrochanteric fractures have been simply treated with curved Rush rods fashioned with long hooks that embed into the greater trochanter. As mentioned previously, roentgenographic equipment is rarely available in the operating room and incisions must be appropriately planned to allow proper visualization for nail- or guidepin placement.

Pathologic fractures present another dimension to the previously mentioned problems because ancillary services such as radiation therapy and chemotherapy and materials such as methylmethacrylate are not commonly available. Thus by necessity these fractures are usually treated with internal fixation, curettage of the tumor, and possibly bone graft.

An especially interesting combination of internal and external fixation from China is illustrated in Figure 4. Femoral neck pins are attached to a molded leather or wooden cuff placed around the upper thigh and act as a sideplate. The pins can be placed percutaneously with local anesthesia and the system allows early ambulation. For subtrochanteric fractures, this splinting may be combined with traction. The results of this treatment are not known.

DISCUSSION

Medical care for this portion of the world's population has many facets. Cultural and religious traditions mandate different approaches to health care. Change from traditional treatment methods is often slow and at times requires integration of new with traditional methods. Patients often travel long distances using primitive modes of transportation to obtain medical care. During certain seasons, such as the monsoons, the trip often cannot be made at all and must be postponed. Initial treatment as well as follow-up care becomes a prohibitive logistic problem in these societies. A 60-mile trip to a regional hospital by cart, boat, or on foot may take several days. Because of the great numbers of patients and the difficulty with follow-up care, statistical analysis is most often not possible.

Medical facilities and supplies are scarce commodities. When possible, instruments are made in innovative ways from local resources. In Bangladesh, hip fixation devices are often made from stainless steel stock, bent and cut in the hospital shop to fashion a Blount-type nail. Many supplies are donated from more affluent countries and are certainly appreciated and useful. If the sizes are not correct, they are altered appropriately. Jewett nails, for in-
stance, can be cut to the appropriate length to accommodate a smaller patient. Many of the donated supplies or materials are those no longer used in the country of origin. However the principles on which these implants were based originally are sound. Recent "improvements" have often been marginal in nature; and thus the older devices remain functional.

Methods that work in developed countries do not necessarily work in a less developed area. The use of simpler methods offering less ambitious benefits is often the most prudent course, allowing conservation of the limited resources of human skill, time, and materials. Hospital costs are usually less than those in more developed countries. At times the per diem may be as low as two U.S. dollars. Often the family provides meals, medications, and supplies to their hospitalized relatives. Thus prolonged hospital stays, such as required by traction treatment, are not necessarily financially devastating.

Operative/nonoperative treatment choices involve complicated decision-making at many levels. The advantages of internal stabilization of hip fractures are well accepted; however, the capability of carrying it out predictably and safely does not always exist in developing countries. Infection rates are high. It is not uncommon for patients awaiting surgery to be delayed for want of blood, operating room linen, lack of anesthetic agents, and a whole list of other problems. The result is that a time-saving operation may not in the end, save time nor spare complications. Nonoperative treatment can conserve resources needed for treat-
ing those injuries that can only be dealt with adequately by surgical methods, such as fractures of the olecranon, unstable ankle fractures, or displaced patella fractures.

The decisions that must be made regarding the use of health care resources are not a great deal different in any locale. While the level of sophistication of the product may differ, the basic decision of resource allocation is the same. Some areas of the world wrestle with the decision concerning organ transplant and artificial heart technology; other areas are concerned with the availability of simple implants, basic sanitation, nutritional needs, and the availability of even the simplest of medicines. The question becomes how to provide the highest level of care to the greatest number of people given limited resources. Prevention of complications by judicious decision-making is one method of proven resource conservation. Procedures easily performed safely in the developed world are not always done so in less developed areas. Safe anesthesia, adequately equipped, clean operating rooms, availability of prophylactic antibiotics, and the like are simply not available to the entire world.

REFERENCES