# Surgical Problems of the Navajo and Hopi Indians

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For the past decade I have been a surgeon to the Navajo and Hopi Indians of Northern Arizona. The Navajo Reservation, occupying 25,000 square miles and containing about 110,000 Navajo and 5,000 Hopi Indians, is divided into eight Indian Health Service Units under the United States Public Health Service. Because of the isolation, the difficulties of transportation, and the scarcity of other medical facilities, the Indian population within that Service Unit uses the Indian Health Service facility almost exclusively. Thus, the data collected over the period of time give an accurate picture of the disease patterns of these people. During the years of this report, I was surgeon in two of the Service Units (Tuba City, on the more isolated western reservation, from January 1962 to July 1965 and July 1970 to the present; and Fort Defiance, 150 miles to the east on the more developed eastern part of the reservation, from July 1966 to July 1970). Each Service Unit has a central hospital (Tuba City 75 beds, Fort Defiance 125 beds) and provides direct and referral surgical service to approximately 20,000 Indians, covering a geographic area of about 8,000 square miles.

The purpose of this report is twofold: (1) to portray the surgical disease patterns in the Navajo and Hopi Indians as personally observed and managed by myself; (2) to emphasize the direct relationship between the morbidity of the disease patterns and the harsh and hazardous environment of the Indian. In the ten years I have served the Navajo and Hopi, significant changes in the socioeconomic levels have occurred. Although the Indian still lives in a condition of marked poverty, improvements in roads, water supply and sanitation, housing, and job opportunities have had a most important impact on disease patterns. The effects are most obvious in the changing patterns of infectious diseases (such as the very common diarrheal diseases and respiratory diseases), but are also evident in the types and presentation of surgical problems. As improvement continues in the socioeconomic life of the Indian, the pattern of disease will continue to change. The present paper will emphasize especially the pattern of surgical disease as seen in the more isolated and underdeveloped western part of the reservation, contrasting the early 1960's with the early 1970's.

This report will not catalog all surgical problems managed by myself, but rather will stress those categories of disease that either are rather unique to this group of Indians or illustrate the thesis just presented. Only those cases in which surgery was performed are reported.

## Gallbladder Disease

Diseases of the biliary tract make up the largest single category of surgical operations for the Navajo and Hopi. In this study, 462 biliary tract operations were performed. A high proportion of patients present because of acute complications of the disease, such as acute infection or jaundice. Table I illustrates the changing pattern of disease presentation over the past ten years.

Similarly, at surgery far advanced disease is found in a majority of patients, both those with an acute process in which necrosis, gangrene, cholangitis, or pericholecystic abscess is common and those with a chronic process in which dense scarring and adhesions, obliteration of the gallbladder, or internal fistula formation is common. Table II illustrates the changing pattern of operative findings over the decade.

In the over-all group of 462 operations there were two postoperative deaths. Fifteen of patients with cancer died within one year; one patient is an eight year survivor. More patients are now seeking help before far advanced disease is present. Several factors contribute to this: a greater sense of trust and

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**TABLE I** Presenting Findings of Patients Undergoing Gallbladder Surgery

| Findings | 1962–1965 | 1970–1971 |
|---|---|---|
| Acute complications | 54% | 43% |
| Less urgent digestive complaints | 46% | 57% |
| Total patients | 147 | 72 |

**TABLE II** Findings at Surgery for Gallbladder Disease

| Findings | 1962–1965 | 1970–1971 |
|---|---|---|
| Far advanced disease | 65% | 50% |
| Cancer | 4% | 0 |
| Common duct stones | 27% | 15% |
| Total patients | 147 | 72 |

**TABLE III** Appendectomies

| Difficulty | 1962–1965 | 1970–1971 |
|---|---|---|
| Ruptured | 62% | 50% |
| Error in diagnosis | 19% | 15% |
| Total patients | 35 | 26 |

**TABLE IV** Gastric Operations

| Disease | Number of Patients |
|---|---|
| Cancer | 10 |
| Benign gastric ulcer | 3 |
| Bleeding gastritis | 3 |
| Hiatal hernia | 5 |
| Miscellaneous | 5 |

confidence in the White Man's medicine; a better understanding on the part of the Indian of the disease process; and the easier access to health facilities through better roads and more families with pick-up trucks. In the earlier years it was relatively common for the patient to first seek help from the traditional Navajo medicine man with a delay of many days while the healing ceremony was performed. As a result, patients often arrived at the hospital in a far advanced stage of disease. The medicine man is still an important figure in the cure of the disease, but today the patient frequently undergoes surgery before the curing ceremony.

### Appendicitis

With the very high incidence of gastroenteric infections, symptoms of abdominal pain and cramps (often localized in the right lower quadrant) can mislead both the patient by delaying his efforts to seek medical care and the physician in his attempts to diagnose. Over this ten year period 181 appendectomies were performed. Table III presents the changing picture of appendicitis in the two separate Tuba City periods.

### Gastroduodenal Surgery

Duodenal ulcer is rare in the Navajo and Hopi Indians. I have not personally seen a proved case. In contrast, gastric problems do occur. Twenty-six major gastric operations were performed, indications for which are listed in Table IV.

Because of the high frequency of carcinoma, I have followed an aggressive policy regarding gastric ulcers, and most patients with this problem have had resection. Upper gastrointestinal bleeding is seen not uncommonly, almost always due to alcoholic gastritis. This is usually self-limited and rarely requires intensive management, transfusion, or surgical intervention. Medical and surgical problems related to acute alcoholic intoxication are very common, but problems of chronic alcoholism are rare at present although this pattern is changing as more true chronic alcoholics are developing in this population. Hiatal hernia is occasionally seen, but does not often require surgical therapy.

### Cancer

Patients undergoing surgery for cancer in the various systems (exclusive of gynecologic cancer) are presented in Table V.

**TABLE V** Patients Undergoing Surgery for Cancer in Various Systems, Exclusive of Gynecologic Cancer

| Location | Number of Patients |
|---|---|
| Biliary tract | 16* |
| Pancreas | 3 |
| Stomach | 10 |
| Thyroid | 8 |
| Rectum and colon | 4 |
| Prostate | 6† |
| Kidney | 3 |
| Bladder | 1 |
| Breast | 2‡ |
| Lung | 1§ |
| Occasional miscellaneous cancers of skin and salivary glands | |

* An over-all malignancy rate of 3.5 per cent.

† The majority had small foci of malignancy found on sectioning the gland removed for obstructive hypertrophy in a total of eighty-three cases.

‡ Both patients had intraductal carcinoma.

§ Alveolar cell.

**TABLE VI Patterns of Thyroid Surgery**

| Condition | Number of Patients |
|---|---|
| Hyperthyroidism | 12 |
| Nodules and goiters | 30 |
| Cancer | 8 |

**TABLE VIII Genitourinary Calculi in Children**

| | Age | |
|---|---|---|
| Calculi | Under 6 Years | Over 6 Years |
| Bladder-urethra stone | 90% | 15% |
| Kidney-ureter stone | 10% | 85% |
| Infected urine | 40% | 75% |
| Total patients | 12 | 14 |

The high preponderance of malignant lesions is found in the upper gastrointestinal tract. Notably infrequent are cancer of the breast (inflammatory and infectious lesions are common in this primarily breast-feeding population) and cancer of the lung (in this relatively nonsmoking population). Carcinoma of the thyroid is relatively common, as is thyroid disease in general. (Table VI.) Many more cases of thyroid disease are present, but patients often refuse surgery usually because of the absence of distressing symptoms.

## Pediatric Surgery

The birth rate of the population is high, and the percentage of infants and children is higher than in the population of the United States in general. There have been approximately 4,500 births during the time of the study, and in the total population group of 20,000 approximately 20 per cent are below four years of age, which covers most of the surgical patients listed in Table VII.

Of special interest is the large number of children with genitourinary calculi. These problems fall into two distinct categories. Young children had primarily bladder or urethral stones and were usually not infected. Older children had primarily upper genitourinary tract stones and had associated infections. (Table VIII.)

Full urologic evaluation revealed no mechanical abnormalities, and blood, urine, and stone analyses failed to reveal a consistent cause. In some of the Near East countries a similar high incidence of bladder stones in young children has been postulated as due to relative protein malnutrition. Protein malnutrition has been very prevalent in this Indian group. In the past two years during which government food

**TABLE VII Pediatric Surgical Cases**

| Condition | Number of Cases |
|---|---|
| Esophageal atresia with fistula | 3 |
| Small bowel atresias | 7 |
| Pyloric stenosis | 1 |
| Imperforate anus | 2 |
| Hirschsprung's megacolon | 2 |
| Congenital diaphragmatic hernia | 2 |
| Intussusception | 6 |
| Inguinal hernia | 71 (patients) |
| Cryptorchid | 13 |
| Genitourinary calculi | 26 |
| Pyopneumothorax after pneumonia | 16 |
| Miscellaneous (biliary atresia; Meckel's; ureteropelvic stricture) | 3 |

distribution programs have provided milk and protein supplements for infants and children, both the directly related diseases (malnutrition, marasmus, and kwashiorkor) and the indirectly related diseases (diarrheal diseases and pneumonia) have decreased. Similarly, twenty-one patients with stones were seen between 1962 and 1965 and three cases have been seen over the past eighteen months. This condition is almost exclusively limited to the western reservation.

Surgical pyopneumothorax was not an uncommon problem after pneumonia in infants and newborns, with thirteen cases occurring between 1962 and 1965. There have been no cases requiring surgery over the past eighteen months.

## Postoperative Problems

The major postoperative death-dealing complications seen in the non-Indian are rare in this population. Atherosclerotic cardiovascular disease is very rare, and even patients in their seventies and eighties rarely have disease of the coronary arteries or absence of pedal pulses. Cerebrovascular disease occurs but is usually due to hypertension. Exclusive of traumatic vascular problems only three cases of vascular problems requiring surgery have been seen; all three involved emboli of the lower extremities secondary to rheumatic heart disease (a not uncom-

**TABLE IX Patterns of Trauma**

| Trauma | Number |
|---|---|
| Extremity fractures | Approximately four cases per week |
| Major intraabdominal injuries | 13 patients |
| Thoracoabdominal injuries | 12 patients |
| Intracranial injuries requiring craniotomy | 20 patients |

mon problem). Postoperative venous thrombosis is rare, and over this time period there have been no deaths due to this disease and only one proved diagnosis in this group of surgical patients (a total of approximately 1,800 major operations). Although respiratory disease is frequent, it is almost always due to acute infection wherein the healed lung retains its elasticity. Obstructive emphysema is rare, and the surgeon does not face the problem of having to provide intensive respiratory support to the postoperative patient.

## Trauma

Although gallbladder disease leads as the most common condition requiring surgery, the general category of trauma is the most common problem to be managed by the surgeon. A decade ago falls from horses were a leading cause of injuries; today highway accidents have become the leading cause of injuries with serious morbidity or mortality. Alcoholism is a major underlying factor. A brief resume of the types of trauma seen is presented in Table IX.

When possible, patients with head injuries requiring surgery are flown to a neurosurgical center, but in many situations related to bad weather or rapid deterioration of the patient's condition, the 200 mile trip to the nearest center cannot be made, and craniotomy must be performed on the spot to evacuate the subdural or epidural hematoma (seventeen and three cases, respectively).

## Summary

This report, based on ten years of personal surgical experience among the Navajo and Hopi Indians, portrays the pattern of surgical disease among these Indian groups. The acute conditions of trauma and infection make up the majority of cases managed, with gallbladder surgery being the single most common major operation. Patterns of cancer are presented, illustrating especially the high incidence of cancer of the upper gastrointestinal tract and the low incidence of lesions of the breast and lung. For the most part the Indians are cooperative and physically strong surgical patients, and the absence of degenerative pulmonary and cardiovascular conditions makes the postoperative course relatively uncomplicated.

Many of the disease conditions are directly due to the impoverished conditions of housing and sanitation, and many patients present with far advanced disease primarily due to the long distances and poor roads between their homes and the health facility. As the socioeconomic conditions improve, many of the diseases now prevalent will decrease or disappear. This paper illustrates this changing disease pattern as social and environmental improvements occur.