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MFR PAPER 1048

Surgical Attachment of a Telemetry Device to the Dorsal Ridge of a Yearling California Gray Whale, *Eschrichtius robustus*

JOHN C. SWEENEY and JOEL L. MATTSSON

ABSTRACT

Surgical attachment of an instrument package mounting device onto the dorsal ridge of a yearling female California gray whale, Eschrichtius robustus, *was accomplished through the utilization of four large polypropylene sutures. Use of polypropylene and polyester fabric meshes to induce tissue growth around the sutures was not successful. Post-operative therapy was beneficial in insuring adequate healing at the suture sites. The original polypropylene sutures were replaced the day before release by polyvinyl chloride coated stainless steel.*

INTRODUCTION

In March 1971, an infant female gray whale was captured within Scammon's Lagoon, Baja California, and subsequently transported by boat to Sea World, Inc. in San Diego, Calif. The animal was captured for research purposes, and for the year following her capture, various studies were undertaken.

As the animal approached 1 year of age, the financial burden to Sea World in holding facilities, personnel, and food made it necessary to design a plan for her release. At that time, W. E. Evans, of the Naval Undersea Center, San Diego, proposed (with the support of the National Oceanic and Atmospheric Administration) that the whale be released carrying a telemetry device for tracking and recording.

Evans (1971) has reported the use of radiotelemetry devices attached to the dorsal fin of dolphin, using a bolt placed through the fin. Martin, Evans, and Bowers (1971) have utilized a harness for the fixation of a device onto a pilot whale. A gray whale has no dorsal fin for bolt fixations, and the growth rate of this animal left the harness method undesirable. Therefore, a surgical fixation was considered the method of choice.

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MATERIALS AND METHODS

Sutures composed of 3 mm diameter polypropylene were swaged onto a stainless steel needle made from 3 mm diameter rod shaped into a 10 cm diameter half circle. Polypropylene was chosen because of its inert nature in mammalian tissues (Usher et al., 1962) and because of its availability in the dimensions required. Two types of prosthetic mesh were used in conjunction with the sutures, polypropylene (Marlex®[1]) mesh and polyester fiber (Mersilene®[2]).

Five weeks before the scheduled release, an attempt was made to place polypropylene mesh pads (2 cm × 2 cm) subdermally at the entrance and exit sites of the four proposed sutures at positions on a longitudinal plane 10 cm to either side of the dorsal ridge and 10 cm apart. The intention was to induce collagen fiber infiltration within the fabric to add strength to the skin and to prevent infiltration of water once the sutures were in place. The skin was closed with simple interrupted nylon sutures.

Four weeks before release the four polypropylene sutures, each having had a sheet of polyester fabric attached to it using Eastman 9-10 adhesive,[3] were placed at the proposed sites. Depth of penetration of the sutures was later confirmed by ultrasonography to be from 4 to 6 cm (Curran

[1]Cavol, Inc., Providence, R.I. Reference to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.
[2]Ethicon, Inc., Somerville, N.J.
[3]Eastman Chemical Products, Kingsport, Tenn.

and Asher, 1974) all lying within the fatty tissue between blubber and muscle. Once in position, the suture ends were temporarily fused, each suture forming a ring enclosing the dorsal ridge (Figure 1). Each surgical procedure was done under local anesthesia, using 2 percent Xylocaine.

RESULTS

Both attempts to utilize mesh fabrics were unsuccessful. Because no fascial interface is present between epidermis and dermis, or dermis and hypodermis, in cetaceans, placement of mesh pads under the skin was not accomplished. After attempts were made at two of the operative sites, it became apparent that it would be too difficult to embed the pads properly. In addition, the sutures cut through the epidermis when even light tension was applied, preventing adequate closure of the incision. Because of these problems, the procedure was not completed. Within 5 days, each of the mesh pads had been sloughed.

The mesh coated sutures did not induce tissue infiltration, but rather, acted as an irritant with a consequent tissue inflammatory response.

Some drainage from the suture holes was observed on the third postoperative day, and at this time, all four sutures were easily moved back and forth within their tissue bed. The exudate was composed of clear, nonviscous fluid containing tags of white coagulated matter dispersed throughout. Cellular composition was 70 percent mature neutrophils and 30 percent lymphocytes. Swabs were taken on the third postoperative day and on two subsequent occasions. No bacteria were found. Daily flushing of each suture site with normal saline and nitrofurazone solution was done for the next three postoperative weeks. At no time did the animal appear sick, nor was there any indication in her blood tests to suggest that an infection

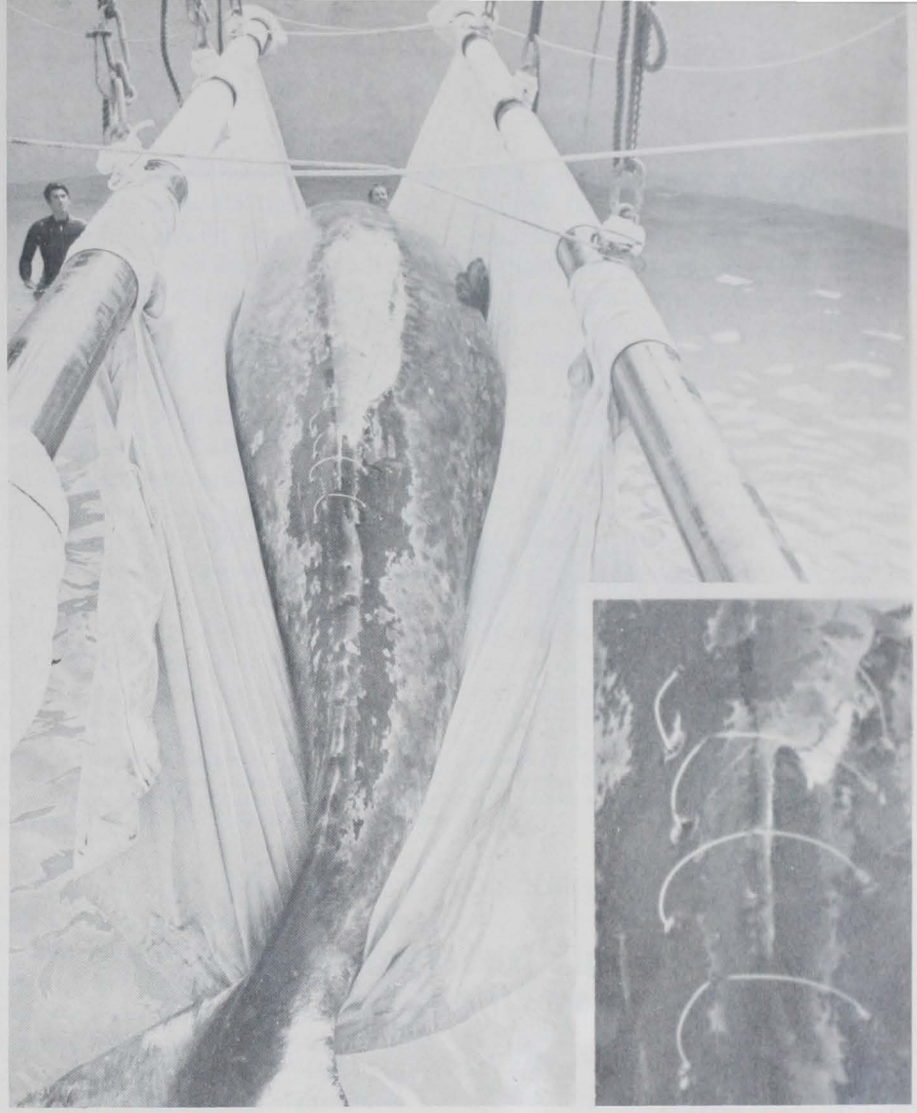

Figure 1.—Polypropylene sutures in position with ends fused, forming a ring enclosing the dorsal ridge.

Figure 2.—Normal healing around polypropylene sutures.

was present. By the end of the 3 week postoperative period, normal healing was considered well underway (Figure 2), and there was, by then, no drainage from any of the suture sites, though the sutures were still freely movable.

One week before the scheduled release, the instrument package saddle was mounted onto the sutures to allow the animal time to adjust to it before adding the somewhat heavier (approximately 6 kg) instrument package itself. The animal occasionally rubbed the saddle against the side of the tank until the attachment was tightened to reduce free-play of the saddle as the animal swam. On the day before release, cracking of the polypropylene sutures was noticed, requiring their replacement with sutures of the same diameter composed of polyvinyl chloride coated stainless steel. These were found to be more pliable and stronger than the polypropylene.

At the last visual sighting of the animal on 7 April 1972, the instrument package was still securely attached despite the fact that, on several occasions, kelp had been seen trailing from it (J. S. Leatherwood, pers. comm.). At this time, we have no indication that this procedure has, in any way, compromised the ability of this animal to survive.

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MFR PAPER 1049

Some Hematologic Observations on the California Gray Whale

ALFRED ZETTNER

ABSTRACT

Examination of the blood of the California gray whale, obtained shortly after its arrival at Sea World, San Diego revealed the following data: WBC-13.9 × 10^3/cubic mm; RBC-2.4 × 10^6/cubic mm; hemoglobin-10.0 g/100 ml; hematocrit-31 percent; MCV-128 μ^3; MCH-42.8 $\mu\mu$g; MCHC-32.4 percent. Hemoglobin electrophoresis showed a single hemoglobin band with a mobility similar to that of human hemoglobin F. The whale hemoglobin was 100 percent alkali resistant. No changes of this hemoglobin were seen on repeated analyses over the course of 12 months.

The capture of a young, female California gray whale, *Eschrichtius robustus*, in Scammon's Lagoon, and its maintenance in captivity at Sea World, San Diego for 12 months provided the opportunity for some hematologic studies which are to be reported here.

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ROUTINE BLOOD EXAMINATION

A heparinized blood sample obtained on 18 March 1971, one day after the arrival of the whale at Sea World, was brought to the Clinical Laboratories of University Hospital, University of California, San Diego. The blood was analyzed on a Coulter Counter,[1] Model "S", which allows the automatic simultaneous determination of cell counts, mean corpuscular volume (MCV), and hemoglobin content. The hematocrit, mean corpuscular hemoglobin (MCH), and the mean corpuscular hemoglobin concentration (MCHC) are automatically computed from the three parameters measured (Pinkerton et al., 1970) The instrument is standardized twice daily and performs approximately 200 analyses per day for clinical purposes. The results were the following:

WBC-13.9 × 10^3/cubic mm
RBC-2.4 × 10^6/cubic mm
Hemoglobin-10.0 g/100 ml
HCT-31 percent
MCV-128 μ^3
MCH-42.8 $\mu\mu$g
MCHC-32.4 percent

A *blood smear* was prepared and stained by the automatic HEMA-TEK[2] technique, which employs a

[1]Coulter Electronics, Inc., Hialeah, Fla. References to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.

[2]Ames Company, Division of Miles Laboratories, Inc., Elkhart, Ind.