Chapter 10

SUMMARY AND FUTURE SCOPE OF WORK

Computer-assisted techniques were introduced in spine surgery in the 1990s to improve accuracy and safety of operative procedures. Several reports on clinical results of computer-aided screw insertion in the cervical, thoracic, and lumbar spine as well as the sacro-iliac joints are available. They show a significant decrease of screw malplacement rates as compared to conventional insertion techniques. The quality of preoperative planning of spinal procedures has improved markedly by using computer navigation systems. Drawbacks, reliability problems, and safety issues of computer navigation are discussed. In the near future, the use of computer guidance for minimally invasive and percutaneous spine procedures is expected.

Now it is universally accepted that Computer assisted pedicle screw placement gives better accuracy and precisions, when compared to conventional methods. Hence the complications are much less and the clinical outcome excellent. There are different sophisticated systems,
developed for pedicle screw placement. But they are prohibitively expensive even in advanced countries. Hence a new software was developed indigenously to give the benefits of Computer assisted surgery to the poor patients of our country. The accuracy of the new software is comparable to the accuracy of sophisticated software published in literature, as evidenced by cadaveric and clinical studies. The cost of commercially available system today is around Rs. One crore and the cost of the new software and the system is only around Rs. twenty five thousand (25,000.00). The system was given free of cost to Medical College, Kottayam and hence the latest procedure is available to the poor patients of government medical college. free of cost.

The research work is continued to upgrade and refine the systems for better accuracy and extended applications in other orthopaedic procedures. A number of researchers and manufacturers have presented solutions or suggested ideas to overcome some of the disadvantages still existing in today's navigation systems.
The intraoperative registration of CT images is still a crucial step. A number of alternative methods try to solve this problem. A-mode (amplitude mode) ultrasound has been suggested as a "virtual pointer" [Maurer] for the acquisition of single points that then could serve as input to the established registration algorithms. Although this appears to be straightforward in theory, it is lacking practicability. B-mode (brightness mode) ultrasound in contrast is easier to handle because it scans a fan-shaped area rather than a single axis. From a technical standpoint, the resulting two-dimensional images are noisy, and the automated detection of bone contours is a challenging image processing task. As a consequence, only experimental results are available [Amin] of the application of this technique to anatomical areas other than the spine. Another alternative registration technique involves the fusion of pre- and intraoperative imaging. Calibrated fluoroscopic images can be analyzed to identify the visualized bony topology and to use this data for a registration with a preoperative CT scan. As for B-mode ultrasound registration, automating the bone contour finding in a reliable way is difficult. Although one manufacturer offers this feature for spinal surgery already, the method does not seem to be applicable in every case [Verheyden].
One of the major thrusts in spine surgery today is to develop minimally invasive procedures. By definition, minimally invasive surgery utilizes small skin incisions, minimizes the damaging effects of large muscle retraction, and attempts to leave the body as naturally intact as it was prior to surgery. The goal is to achieve rapid recovery, lessen post-operative pain, and leave cosmetically satisfying incisional scars.