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The 7th Saudi Spine Society Annual Conference Proceedings in November 2023 in Riyadh, Saudi Arabia

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Background

The Saudi Spine Society's (SSS) 7th annual conference will be hosted in Riyadh November 17th - 19th, 2023 and is expected to have more than 550 attendees worldwide. The first day will include seven workshops covering spine diseases and management, including physical therapy, pain management, surgical treatment, evolving technology, and innovation in spine care and research. In the morning, three workshops will be conducted. These workshops will be about ultrasound-guided interventions as a treatment for common spine problems and intraoperative neurophysiological monitoring (IONM). The remaining workshops will be held in the afternoon. They will be about innovative techniques and technologies in spine surgery, neuro life-cervical spine trauma, clinical neurodynamics for the neuromusculoskeletal system and the essentials of writing medical research papers.

This will be followed by two days of the main conference with several local, regional and international speakers. The keynote speaker will be Prof. Khahled Kebaish, who will speak about adult deformity surgery. Also, 45 lectures, including several keynotes from national and international leaders in spine, and 24 peer-reviewed abstracts will be presented.

The conference halls will include new technologies and the latest surgical and non-surgical equipment updates.

The following are the accepted abstracts for podium presentation at the 7th Saudi Spine Society annual conference:

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1. TREATING DISC PROLAPSE WITHOUT SURGERY, OZONE NUCLEOPLASTY

Shahzad Bhatti

Introduction

Ozone Nucleoplasty involves a combination of 97% oxygen and 3% ozone and is used to treat herniated discs. It is a minimally invasive procedure using ozone's biochemical properties to reduce disc volume. When it is used with a peri ganglionic injection of a local anesthetic and a small amount of steroid, the effects are more pronounced, causing a reduction of both disc volume and inflammation, resulting in significant pain relief.

Methodology

Percutaneous injection of ozone was given without any form of anesthesia to the lumber disc under fluoroscopy guidance at a concentration of 27 micrograms/ml to 49000 patients along with a combination of local anesthetic and steroid in peri ganglionic space from January 2008 to March 2022. All patients presented with clinical signs and symptoms of lumber disc herniation, which an MRI of the lumbosacral spine verified. Their pain score was calculated with a modified Macnab method.

Result

A satisfactory therapeutic outcome was obtained. 55% of the patients showed complete recovery with resolution of symptoms. 20% of the patients complained of occasional episodic pain with no limitation of occupational activity. 15% of cases showed insufficient improvement. 5% of patients had insufficient improvement and went for surgery. 10% of cases never returned after the first visit.

Conclusion

Intradiscal ozone for the treatment of herniated discs has revolutionized the percutaneous approach to nerve root compression, making it safer, more economical and easier to repeat without any side effects than treatments currently used in Pakistan.

2. THE EPIDEMIOLOGY, CLINICAL PRESENTATION, AND TREATMENT OUTCOMES IN SPINAL SUBDURAL ABSCESS: A SYSTEMATIC REVIEW

Ebtesam Abdulla

Introduction

Spinal subdural abscess (SSA) is the least common area of localized infection in the central nervous system. There has been no systematic review of these entities in adults, with the cumulative knowledge of the pathophysiologic, microbiologic, and demographic characteristics of these infections relegated solely to a few small series and case reports. This study aimed to present the outcomes and clinical experience of managing SSA in adults.

Methodology

A systematic review was performed by searching online databases to analyze all reported cases of SSA in adults.

Result

Data on 64 patients were identified and analyzed. 51.56% patients were male. The mean age was 49.17 (range; 19-87) years. Local pain, fever, and weakness were the most common symptoms. The lumbar vertebrae were the most frequently involved. The dorsal was involved in 75% of the patients, and only 10% had holospinal involvement. The median

time between the primary source of infection and the SSA was 38.18 days (1-720 days). The most common isolated organism was the Staphylococcus aureus. 53 patients were managed surgically; 11 patients underwent drain insertion, and 10 patients received only antibiotics treatment. Forty patients were discharged to their homes, nine were discharged to skilled nursing facilities or rehabilitation centers, and ten were deceased. The mean follow-up duration was 11.94 months (CI 7.09-16.79). According to the ASIA score, the outcome improved in 47 patients after surgical intervention, deteriorated in eleven patients, and remained unchanged in six patients.

Conclusion

SSAs are rare. Prompt diagnosis and management can lead to good outcomes, especially after surgical intervention.

3. A COMPARATIVE STUDY OF BRACE-RELATED STRESS AND QUALITY OF LIFE PARAMETERS BETWEEN CHÊNEAU BRACES AND CONVENTIONAL BOSTON BRACES ON A SAMPLE OF SAUDI SCOLIOTIC PATIENTS

Khalid Alharbi

Introduction

Adolescent idiopathic scoliosis (AIS) is the most common spinal deformity that affects healthy children. Despite being asymptomatic and not posing a threat to life, the deformities resulting from AIS can significantly influence a patient's quality of life (QoL). To determine the optimal bracing type for patients diagnosed with Adolescent Idiopathic Scoliosis, emphasis must be placed on gauging their quality of life (QoL) and stress levels. There is a dearth of research comparing the effectiveness of Chêneau bracings versus Conventional Boston bracings on these two parameters.

Methodology

This cross-sectional study was conducted at King Saud University Medical City (KSUMC) in Riyadh, Saudi Arabia. 52 eligible patients were selected via the stratified random sampling technique with the type of brace used as the main strata. Data were collected from eligible patients who fit our inclusion criteria, which included having idiopathic scoliosis, ageing 10 years or older, wearing a brace for at least three months, and having no history of cancers. The independent samples t-test and Pearson's correlation coefficient statistical tests were used in this study.

Result

The total number of participants treated with the Conventional Boston brace was 32, while the total number of participants treated with Chêneau braces was 20. The total scores of SRS-22r did not show a significant difference between patients who wore Conventional Boston braces (3.68±0.69) and those who wore Chêneau braces (3.49±0.62) ($p>0.05$). Patients who wore Chêneau braces reported significantly lower treatment satisfaction compared to those who wore Conventional Boston braces ($p<0.001$). Additionally, there was a significant difference in brace-related stress between patients wearing Conventional Boston braces (10.09±3.72) in comparison to patients wearing Chêneau braces (7.15±3.25) ($p<0.01$).

Conclusion

The quality of life for our patients with AIS was comparable between the two types of braces. Nonetheless, those who used Chêneau braces experienced higher stress levels and lower treatment satisfaction rates than those who opted

for Conventional Boston bracing. This information highlights the need for in-depth research into the matter.

4. THE SAFETY AND FEASIBILITY OF EXERCISE INTERVENTION FOR ADULTS WITH SPINAL METASTASIS: A SYSTEMATIC REVIEW

Amani Aljohani

Introduction

The spine is the most common location of bone metastases, affecting around 20% of adults with cancer. This systematic review aimed to identify the effect of exercise and physical activity interventions previously utilized in adults with metastatic spine disease and to review the reported adverse events.

Methodology

A systematic literature search was conducted using PubMed, CINAHL, EMBASE, and PEDro for randomized controlled trials published between January 2011 and June 2023. Co-author teams performed extraction, and quality and bias were evaluated using the Cochrane Risk of Bias 2.0 (RoB 2).

Result

A total of 212 records were assessed, eight of which qualified for inclusion in this review, all from the same two clinical trial protocols. The eight studies included 116 adults with spine metastasis. The exercise interventions included isometric spinal stabilization exercises supervised for approximately two weeks and continued as home exercises ranging from 12 to 24 weeks. The included studies showed that physical fatigue, pain, and bone density improved significantly with exercise training for individual participants with spine metastasis. No adverse events were reported in any study included during the study period.

Conclusion

Appropriately prescribed and administered isometric spinal stabilization exercises appear safe for adults with metastatic spine disease as no adverse events and improvements in several measures, such as pain, quality of life, and physical function, were reported.

5. AO SPINE GUIDELINE FOR THE USE OF OSTEOBIOLOGICS IN ANTERIOR CERVICAL DISCECTOMY AND FUSION FOR SPINAL DEGENERATIVE CASES

Waeel Hamouda

Introduction

To develop an international guideline (AOGO) about the use of osteobiologics in Anterior Cervical Discectomy and Fusion (ACDF) for treating degenerative spine conditions.

Methodology

The guideline development process was guided by the AO Spine Knowledge Forum Degenerative (KF Degen) and followed the Guideline International Network McMaster Guideline Development Checklist. The process involved 73 participants with expertise in degenerative spine diseases and surgery from 22 countries. 15 systematic reviews were conducted addressing key topics, and evidence was collected. The methodologist compiled the evidence into GRADE Evidence-to-Decision frameworks. Guideline panel members judged the outcomes and

other criteria and made the final recommendations through consensus.

Result

Five conditional recommendations were created. A conditional recommendation was about the use of an allograft, autograft, or a cage with an osteobiologic in primary ACDF surgery. Other conditional recommendations were about the use of osteobiologic for single or multi-level ACDF and hybrid construct surgery. In common clinical situations, it was suggested that surgeons use other osteobiologics rather than human bone morphogenetic protein-2- 2 (BMP-2). Surgeons are recommended to choose one graft over another or one osteobiologic over another primarily based on the clinical situation and the costs and availability of the materials.

Conclusion

This AOGO guideline was the first to provide recommendations for using osteobiologics in ACDF. Despite the comprehensive searches for evidence, few studies were completed with small sample sizes and primarily as case series with inherent risks of bias. Therefore, high-quality clinical evidence is demanded to improve the guidelines.

6. MISTUBULAR DISCECTOMY VS CONVENTIONAL VS. ENDOSCOPIC FOR TREATING LUMBAR DISK HERNIATION: IS ANY OF THEM A BETTER OPTION FOR MANAGEMENT

Khalid Almadni

Introduction

The surgical procedure for the treatment of lumbar disc herniation is open discectomy. Minimally invasive discectomy with tubular retractors and endoscopies is hypothesized to cause less tissue damage, lower blood loss, less postoperative pain, and faster recovery.

Methodology

Case series

Result

This study aimed to compare postoperative complication rates and outcomes of patients undergoing tubular discectomy with those undergoing the endoscopic and open conventional approaches.

Conclusion

Conventional methods had no difference with tubular discectomy while endoscopic methods had earlier, better outcomes.

7. FUNCTIONAL EVALUATION OF PATIENTS WITH LUMBER DISC PROLAPSE AFTER ENDOSCOPIC DISCECTOMY

Mohammed Elzain

Introduction

Lumbar disc prolapse is a common neurosurgical problem that, in many instances, may need surgical intervention, with the risk of serious complications such as a long recovery period and the need for large quantities of medications and, sometimes, the need for blood transfusion. This study aimed to evaluate the role of minimally invasive endoscopic interlaminar discectomy, a new modern surgical procedure used to treat lumbar disc herniation and lumber spinal stenosis, in reducing the incidence of complications commonly encountered with traditional surgical procedures.

Methodology

43 patients with lumbar disc prolapse were selected to undergo endoscopic lumbar discectomy in Mawada Hospital, Khartoum-Sudan, from the first of January to the end of December 2017. The score of the Japanese Orthopedic Association (JOA) for Patients with Lumbar Disc Herniation was utilized to assess patients preoperatively and postoperatively.

Result

The age range of the study population was 16 to 86 years, with a mean age of 41.88 years. 30 (69.8%) patients were males, while 13 (30.2%) were females. The most common presentation was lower extremity pain in 43 (100%) patients, low backache in 37 (86%) patients, lower extremities weakness in 33 (81.4%) patients, sensory disturbance in 40 (93%) patients, sphincter disturbances in 3 (9.3%) patients and gait problems were encountered in 30 (85.3%) patients. Lumbosacral MRI showed L4-5 disc herniation in 25 (58.1%) patients and L5-S1 disc herniation in 12 (27.9%) patients. Upper-level discs were rarely encountered. Discs were found on the right side in 20 (46.5%) patients, on the left side in 19 (44.2%) patients, and centrally located in the remaining four (9.3%) patients. The endoscopic interlaminar approach for disc removal revealed only prolapsed discs in 24 (55.8%) patients, discs with associated hypertrophied ligamenta flave in 18 (41.8%) patients, and only one (2.3%) patient had bony canal stenosis. Postoperatively, 23 (53.5%) patients were cured. 18 (44.2%) patients improved, and one (2.3%) patient remained static. Six (14%) patients had a residual disc that necessitated redo surgery. Complications encountered included surgical site infection in two (4.7%) patients, incidental durotomy with CSF leak in four (9.3%) patients, lower limb weakness in six (14%) patients, and one (2.3%) patients was complicated with spinal nerve root injury.

Conclusion

Successful results can be achieved in the majority of the patients. The Japanese Orthopedics Association score for assessment of lumbar spine endoscopic surgery was found to be a reliable and sensitive tool for assessing lumbar disc patients both pre and postoperatively, and it is advisable to utilize this scale for wide use.

8. HOW FREQUENTLY DOES MRI MODIFY THORACOLUMBAR FRACTURES' CLASSIFICATION OR DECISION-MAKING? A SYSTEMATIC REVIEW AND META-ANALYSIS

Mohamed Ali

Introduction

It is debatable whether magnetic resonance imaging (MRI) can change thoracolumbar fractures (TFL) classification or decision-making sufficiently to justify the increased time, expense, and logistics of getting an MRI in trauma settings. The purpose of this study was to provide the first meta-analysis of the impact of MRIs on TLFs' classification and decision-making.

Methodology

A systematic review was conducted following PRISMA guidelines. We searched PubMed, Scopus, Cochrane, and Web of Science from inception to 30 June 2023 for studies evaluating the change in TLF classification and treatment decisions after an MRI. The studies extracted key findings, objectives, and patient population. A meta-analysis was performed for the pooled frequency of change in AO fracture classification or treatment decisions from surgical to conservative or vice versa after an MRI.

Result

This meta-analysis included four studies comprising 554 patients. The pooled frequency of change in TLF classification was 17% (95% CI: 9% to 31%), and treatment decision was 22% (95% CI: 11% to 40%). An upgrade from type A to B was reported in 15.7% (95% CI: 7.2 % to 30.6%), and downgrading type B to A in 1.2% (95% CI: 0.17 to 8.3%). A change from conservative to surgery recommendation of 17% (95% CI: 5.0% to 43%) was higher than a change from surgery to conservative 2% (95% CI: 1% to 34%).

Conclusion

MRIs can significantly change the thoracolumbar classification and decision-making, primarily due to upgrading type A to type B fractures and changing from conservative to surgery, respectively. These findings suggest that MRI could change decision-making sufficiently to justify its use for TLFs. Type A subtypes, indeterminate PLC status, and spine regions might help to predict a change in TLFs' classification. However, more studies are needed to confirm the association of these variables with changes in treatment decisions to set the indications of MRI in neurologically intact patients with TLFs.

9. INFLUENCE OF WORK-RELATED SAFETY AND HEALTH GUIDELINES ON KNOWLEDGE AND PREVALENCE OF OCCUPATIONAL BACK PAIN AMONG REHABILITATION NURSES IN SAUDI ARABIA: A 6-MONTH FOLLOW-UP

Hani Alabbad

Introduction

Nurses are frequently involved in different types of patient-handling activities in different departments of the hospitals. Mishandling the patients causes accumulative stress on their spine, resulting in occupational back pain (OBP), substantial morbidity, and incurred costs. This study aimed to observe the influence of work-related safety and health guidelines on knowledge and prevalence of occupational back pain among rehabilitation nurses in Saudi Arabia.

Methodology

This cohort study was conducted with 116 registered rehabilitation nurses (mean age = 39.6 years). Following the invitation, these nurses attended an ergonomic workshop focusing on work-related safety and patient handling guidelines, risk assessment, and control of OBP. A self-administered questionnaire was used to assess the knowledge, risk, and prevalence of OBP at baseline and 6-month follow-up.

Result

The perceived knowledge score significantly improved (95% CI; $t = 4.691$; $p < 0.001$; Cohen's $d = 0.72$) at 6-month follow-up mean (SD) = 81.6 (18.2) from its baseline score mean (SD) = 68.2 (19.2). Likewise, the prevalence score of OBP markedly reduced from 71.5% (baseline) to 65.0% (6-month follow-up).

Conclusion

The level of knowledge highly improved, and the prevalence of OBP markedly reduced within a span of 6 months among rehabilitation nurses in Saudi Arabia after attending an ergonomic workshop. Importantly, the nurses learned and geared up themselves for practicing the safe patient handling guidelines to

avoid occupational back pain in the future. Therefore, rehabilitation nurses should update their knowledge and awareness about occupational safety and health guidelines, risk assessments, and control of OBP at regular intervals to increase their knowledge and reduce the prevalence of OBP.

10. TRANSFORMING OUTCOMES OF SPINE SURGERY: EXPLORING THE POWER OF ENHANCED RECOVERY AFTER SURGERY PROTOCOL – A SYSTEMATIC REVIEW AND META-ANALYSES OF 15,198 PATIENTS

Hamzah Magableh

Introduction

Enhanced Recovery After Surgery (ERAS) protocols aim to optimize patient outcomes by reducing surgical stress response, expediting recovery, and reducing care costs. We aimed to evaluate the impact of implementing ERAS protocols on the perioperative surgical outcomes and financial implications associated with spine surgeries.

Methodology

A systematic review and meta-analysis of peer-reviewed studies directly comparing outcome differences between spine surgeries performed with and without utilization of ERAS pathways was conducted along PRISMA guidelines

Result

Of 676 unique articles identified, 59 along with 15,198 aggregate patients (7,748 ERAS; 7,450 non-ERAS) were included. ERAS-treated patients had shorter operative times (Mean Difference, MD: 10.2 mins; $p<0.01$), shorter hospitalizations (MD: 1.41 days, $p<0.01$), fewer perioperative complications (RR=0.64, $p<0.01$), lower postoperative opioid use (MD of morphine equivalent dose: 164.36mg; $p<0.01$), and more rapid mobilization/time to first out-of-bed ambulation (MD: 0.92 days; $p<0.01$). Spine surgeries employing ERAS were also associated with lower total costs (MD: $1140.26/patient; $p<0.01$), especially in the USA (MD: $2869.11/patient, $p<0.01$) and lower postoperative visual analog pain scores (MD=0.61, $p<0.01$), without any change in odds of 30-day readmission (RR: 0.80, $p=0.13$) or reoperation (RR: 0.88, $p=0.60$). Sub-analyses based on the region of the spine showed significantly lower LOS in both cervical and lumbar surgeries implementing ERAS. The type of procedure showed a significantly lesser time-to-initiate mobilization in fusion surgeries utilizing ERAS protocols compared to decompression.

Conclusion

The present meta-analysis indicates that current literature supports ERAS implementation to reduce care costs and safely accelerate hospital discharge for patients undergoing spine surgery.

11. EXOSCOPE AS A VALID ALTERNATIVE TO THE OPERATING MICROSCOPE IN CERVICAL SPINE SURGERY: A SYSTEMATIC REVIEW AND META-ANALYSIS

Ahmed Motawel

Introduction

Anterior cervical decompression and fusion (ACDF) is the surgical standard of care for degenerative cervical myelopathy (DCM). It is unknown whether ACDF with an exoscope (EX) is associated with similar outcomes compared to ACDF with an operating microscope (OM). Therefore, we

conducted a systematic review and meta-analysis to compare outcomes between ACDF with EX and OM.

Methodology

On May 20, 2023, a comprehensive literature search was conducted using PubMed, Scopus, Web of Science, and Google Scholar. Articles that compared ACDF with EX and OM were included. Study characteristics, surgical characteristics, and clinical outcomes were extracted. Standardized mean differences (SMD) and odds ratios (OR), along with 95% confidence intervals (CI), were calculated.

Result

Four studies with 164 patients were included. Clinically, visual analog scale (VAS) was comparable between EX and OM, both at 90 days (SMD= 0.07, 95% CI= -0.23 to 0.36, P-value= 0.66) and 365 days (SMD= -0.26, 95% CI= -0.54 to 0.02, P-value= 0.07). EX was associated with a lower Japanese Orthopedic Association (JOA) Score (SMD= -0.30, 95% CI= -0.53 to -0.06, P-value= 0.01). Neck disability index was comparable between the groups (SMD= -0.08, 95% CI= -0.38 to 0.21, P-value= 0.58), as was blood loss (SMD= -0.18 ml, 95% CI= -0.50 to 0.13, P-value= 0.26) and operative time (SMD= -0.19 min, 95% CI= -0.51 to 0.14, P-value= 0.26). Surgical complications were low in both groups, and there was no statistically significant difference between the groups (pooled OR= 0.40, 95% CI [0.04, 4.15] p=0.44).

Conclusion

Based on early experience, ACDF with EX is a feasible alternative to ACDF with OM regarding clinical outcomes. Future prospective comparative studies are needed to elucidate differences between the two techniques better.

12. STEM CELL THERAPY FOR TRAUMATIC SPINAL CORD INJURY: WHERE DO WE STAND?

Mir Sadat-Ali

Introduction

Traumatic spinal cord Injury (SCI) is a devastating injury that occurs in 54 per 1,000,000 people yearly, and 50% remain paralyzed for life. Given this figure, 1620 men and women in Saudi Arabia get SCI; only 20% improve, and the rest, 1296, remain paralyzed. The development of innovative treatments for SCI is eagerly contemplated, and stem cell therapy (SCT) is one of the anticipated lights at the end of the tunnel. The objective of this review was to elucidate the present position of stem cell research in SCI and where Saudi Arabia stands in the international community in research on the recovery of SCI.

Methodology

We searched all relevant databases, including EMBASE, the Cochrane Central Register of Controlled Trials and Cochrane Database of Systematic Reviews, MEDLINE, Science Citation Index, Scopus, and Web of Science, with keywords of traumatic Spinal cord injury, stem cell therapy for research published from the year 2000 to May 2023. The criteria for analysis included articles involving case reports and clinical trials. The authors evaluated all the data independently, and there was no discrepancy in the papers selected for the review. Analysis of the reported outcomes of each cell type was performed according to gold-standard efficacy outcome measures like the ASIA impairment scale and motor and sensory scores.

Result

Currently, 1,149 clinical trials are focused on improving outcomes after SCIs are registered in the U.S. National Library of Medicine at *www.clinicaltrials.gov*. This review encompassed 145 studies with over 4000 patients. Five different types of cell origins, Autologous and Allogenic Bone marrow, Autologous Adipose Tissue derived, umbilical cord MSCs and Neurocytes, Schwann cells (SCs), Olfactory ensheathing cells, with and without scaffold were used. The number of cells injected varied between 5-20 X106. The site of injections and the number of injections were between 1-3. The sites were intra-thecal, venous, and arterial access. The overall improvement of ASIA Impairment Scale (AIS) grade conversion rates (improvements in ~40% of transplanted patients) surpassed the spontaneous improvement rate expected for complete chronic SCI patients within 1-year post-injury (5–20%). There were no clinical studies on SCI from Saudi Arabia, and there was one preclinical study.

Conclusion

Considerable progress in the treatment of spinal cord injury has been made in recent decades using stem cell therapy. Overall, the results indicated that the efficacy of stem cell therapy is encouraging. At present, clinical trials have issues such as small sample sizes, poor design and control, and blinding. The most important finding was that SCI is not a static disease, and multimodal treatment is necessary for better results. Although much work remains to be completed in this field, the future is bright. We believe spine surgeons in Saudi Arabia should actively participate in clinical trials of treating patients with SCI using stem cell therapy.

13. THE ACCURACY OF ARTIFICIAL INTELLIGENCE AS A CLINICAL DECISION SUPPORT SYSTEM IN DIAGNOSING CERVICAL RADICULOPATHY DUE TO DISC HERNIATION AND SPONDYLOSIS

Almaha Alzahrani

Introduction

Neck pain is one of the most prevalent musculoskeletal conditions worldwide. Cervical radiculopathy is one of the most important causes of these problems. MRI is used worldwide as the ideal diagnostic tool to diagnose these problems, but they are expensive for many patients. Meanwhile, others may suffer from other health diseases that prevent them from undergoing this radiation, which prevents them from diagnosing the condition more appropriately. Considering these factors, artificial intelligence could be an appropriate, accurate, and suitable model for diagnosing cervical radiculopathy. Therefore, the objective of this study was to compare the accuracy of an AI-enabled platform and an Algorithm as a Clinical Decision Support System (CDSS) versus MRI in diagnosing patients affected with cervical disc herniation and spondylosis.

Methodology

Ninety-two male and female patients above 18 years of age who suffer from neck pain were included in the study. The personal and clinical history were taken using the Therapha^{TM} software on the same day or 2 to 3 days before the patient underwent an MRI. First, the Delphi method was used for ten cases to define expert consensus for software. Then, the diagnostic accuracy of AI was determined in terms of sensitivity and specificity compared with MRI.

Result

The results of the Delphi method showed that the Therapha^{TM} software had a 100% agreement for

nine cases and an 80% agreement for one case by the experts for the diagnosis. The software showed a high sensitivity (89.5%) and specificity (62.5%) in diagnosing cervical radiculopathy compared with MRI.

Conclusion

The study results concluded that the Therapha^{TM} software showed high sensitivity and specificity in diagnosing cervical radiculopathy. So thereby, the AI could be used to diagnose cervical radiculopathy, which could be highly recommended in rehabilitation centers where highly sophisticated radio-diagnostic facilities are unavailable.

14. ANTERIOR DISCECTOMY AND FUSION VERSUS POSTERIOR FORAMINOTOMY IN TREATMENT OF CERVICAL RADICULOPATHY: A COMPARATIVE PROSPECTIVE STUDY

Ali Abdelaleem

Introduction

Cervical radiculopathy is caused either by cervical disc herniation or bone spurs due to cervical spine degeneration. It is common in middle-aged and elderly patients. Those patients who are refractory to conservative treatment are candidates for surgical management. The surgical approaches for cervical radiculopathy are either anterior cervical discectomy and fusion (ACDF) or posterior cervical foraminotomy (PCF)

Methodology

This prospective randomized controlled clinical study was carried out on 44 patients with unilateral cervical radiculopathy. They were divided into two groups. Group (A) included 23 patients who underwent ACDF, and group (B) included 21 patients who underwent PCF, with 1-year follow-up. The patient's age, sex, clinical manifestations, surgical outcomes, number of cervical levels, operative time, blood loss, complications, and length of hospital stay were recorded. Visual analog scale (VAS) and neck disability index (NDI) were used to evaluate clinical outcomes. Postoperative imaging was done after one year to detect instability or adjacent level degeneration.

Result

Clinical improvement of the mean values of VAS and NDI was more pronounced in the PCF group as compared to the ACDF group, with a statistically significant difference.

Conclusion

Posterior cervical foraminotomy is a safe and effective technique for the treatment of cervical radiculopathy compared to anterior cervical discectomy and fusion.

15. AN ASSESSMENT OF THE LONGITUDINAL CONSTRUCT VALIDITY OF THE PAIN BEHAVIORAL SCALE (PABS) IN A SAUDI POPULATION WITH CHRONIC LOW BACK PAIN: A PRELIMINARY STUDY

Dalia Alimam

Introduction

The Pain Behavioral Scale (PaBS) measures the presence and severity of pain. We examined the longitudinal construct validity of the PaBS using convergent and known groups approaches on a

population of 23 participants with chronic lower back pain (LBP) undergoing routine physiotherapy care and pain neuroscience education.

Methodology

Participants were recruited from patients who attended two testing sessions at physiotherapy clinics in Saudi Arabia. Participant pain behavior was initially measured using the PaBS scale. Participants performed standardized physical tests (e.g., repeated trunk flexion). They provided baseline demographic, clinical data, and self-reported measurements using the Modified Roland and Morris disability questionnaire (MODI), fear-avoidance questionnaire (FABQ), and pain catastrophizing scale (PCS). In subsequent visits, a physiotherapist provided usual care to participants, and weekly sessions were established for online pain neuroscience education. Participants repeated the same questionnaires and physical performance tests with the PaBS during week six. Paired t-tests compare changes in health characteristics from baseline responses to those in week six. Correlations between changes in PaBS from baseline to week six, with changes in outcome measures (i.e., disability, pain intensity, fear-avoidance beliefs, catastrophizing), were determined. To assess known-group validity, we also used a general linear model.

Result

A total of 23 participants completed the PNE and follow-up data collection. The mean change from baseline in the PaBS score was statistically significant, as were changes in MODI, FABQ, and PCS. Almost 70% of participants improved their PaBS scores over the six weeks, with PaBS scores of almost 40% of them improving by three units or more. The change in PaBS score correlated significantly with changes in the PCS-rumination subscale, supporting a proposed approach to estimate convergent validity ($r = 0.44$, 95% CI = 0.04–0.72, $p = 0.035$).

Conclusion

The mean change from baseline in the PaBS score were statistically significant, as were changes in MODI, FABQ, and PCS, supporting its convergent validity. According to our STarT Back groups, the medium to low-risk group had a lower PaBS score, and the high-risk group had a higher PaBS score, indicating that PaBS use in clinical assessment may identify people according to pain-behavior severity, or those at increased risk of developing disability.

16. NUMBER OF LEVELS FUSED: AN INDICATOR OF HARDWARE FAILURE FOLLOWING MINIMALLY INVASIVE ANTEPSOAS FUSION

Rehan Khan

Introduction

Multi-level fusions have historically shown greater operative and postoperative risks. The minimally invasive antepsoas (MIS-ATP) technique for fusions has provided minimally invasive spine surgeons with better L5-S1 access. Some postoperative complications, such as thigh pain, are less likely to occur when avoiding the psoas muscle retraction. Nevertheless, hardware-related complications following the MIS-ATP technique may hinder the postoperative recovery course and may warrant revision surgery. The purpose of this study was to assess the rates of postoperative hardware-related complications of patients with differing numbers of vertebral levels fused via the MIS-ATP approach.

Methodology

This retrospective cohort study included 395 patients who underwent MIS-ATP lumbosacral fusions between 2006-2018 with > 2 years of follow-up. The specific hardware-related complications included proximal junctional-related diseases, pedicle screw-related complications, screw lucency, iliac screw-related complications, and rod breakage and failure. Several covariates were obtained, including demographic variables, BMI, diabetes status, smoking status, and number of previous spine surgeries. Univariate associations were analyzed using independent two-sample t-tests and chi-square analyses. Multivariable logistic regression was used to assess the association between the number of levels fused and the odds of having a hardware complication.

Result

Seventy-five patients experienced postoperative hardware-related complications (Table 2). Univariate analyses showed that patients with complications were older ($p = 0.008$), had longer follow-up durations ($p < 0.001$), and had more spinal levels fused ($p = 0.008$) (Table 1). Simple logistic regression showed that for each additional vertebral level fused, there was a trend of 13.4% increase in the odds of having a hardware-related complication (crude OR = 1.13 (0.99-1.30), $p = 0.075$), whereas multivariable logistic regression found no association (adjusted OR = 1.08 (0.92-1.26), $p = 0.334$) when controlling for covariates (Table 3).

Conclusion

Although there was a crude association between increasing numbers of spinal levels fused and odds of having a hardware complication, demographic and lifestyle variables and prior surgical history explain much of this association. This was shown using the multivariable logistic regression, which found that when controlling for the most influential covariates from the univariate analysis, the association between increasing levels fused and hardware complications did not hold, suggesting that other factors like age, smoking status, BMI, and previous spinal procedures likely account for the crude association between number of spinal levels fused and hardware related complication rate (Table 3). Due to the increased morbidity posed by hardware failure and its complications and given that patients undergoing surgery with larger fusion levels tend to have poorer health, future studies should explore how lifestyle factors can intervene between the procedure and the development of a hardware complication.

17. EXPERIENCE WITH UNILATERAL DUAL PORTAL ENDOSCOPIC TLIF USING EXPANDABLE CAGES: INITIAL CASE SERIES

Alhareth Maaya

Introduction

Unilateral Dual Portal endoscopic transforaminal lumbar interbody fusion (TLIF) has emerged as a minimally invasive surgical technique for treating lumbar degenerative conditions. The use of expandable cages in this procedure offers potential advantages in achieving optimal fusion and clinical outcomes. This study presented the experience of the first six cases performing Unilateral Dual Portal endoscopic TLIF with expandable cages.

Methodology

A retrospective analysis was conducted on five consecutive patients who underwent unilateral Dual Portal endoscopic TLIF with expandable cages. Clinical data, surgical details, intraoperative findings, perioperative outcomes, radiological assessments,

and postoperative follow-up were evaluated. The expandable cage was utilized to restore disc height, promote fusion, and provide stability.

Result

The mean age of the patients was 55-year-old, and 66% were male. The procedure was successfully performed in all cases, with minimal blood loss and no intraoperative complications. Postoperative pain scores showed 83% improvement in a 3-week period. Radiographic assessments demonstrated adequate cage placement, indicating favorable cage placement and early signs of fusion. Early follow-up evaluations indicated favorable and faster recovery in comparison to static cages, with 83% of patients reporting satisfactory pain relief and improved functional status.

Conclusion

The initial experience with Unilateral Dual Portal endoscopic TLIF utilizing expandable cages has shown promising results. The procedure appears to provide effective disc height restoration, stability, and early signs of fusion, leading to favorable clinical outcomes. Further studies with larger patient cohorts and longer follow-ups are warranted to validate the benefits of this technique in comparison to traditional approaches.

18. HARDWARE-RELATED COMPLICATIONS IN PATIENTS WITH TRANSITIONAL LUMBOSACRAL ANATOMY FOLLOWING MINIMALLY INVASIVE ANTEPSOAS SURGERY (MIS-ATP)

Nader El Hajj

Introduction

Transitional lumbosacral anatomy (lumbarization of S1 and sacralization of L5) is present in almost 30% of the population. It may pose higher risks of surgical complications, including higher blood loss rates, vascular injuries, and misplaced hardware. While prior studies have examined the intraoperative surgical complications posed by the presence of transitional spine anatomy, few have evaluated the rates of postoperative hardware complications. This study aimed to assess the rate of hardware-related complications in patients with transitional lumbosacral anatomy (TLA) following the MIS-ATP.

Methodology

To assess rates of postoperative complications in patients with TLA, a sample of patients with TLA was case-matched with a randomly sampled group of patients with standard lumbosacral anatomy (SLA). The samples were subcategorized into short (2-3 levels) and long (4+ levels) fusion. A chart review was conducted to determine estimated blood loss (EBL), wound and hardware complications, adjacent segment disease (ASD), and pseudoarthrosis. Additional variables such as smoking, BMI, and prior surgeries were also measured. The odds ratio was calculated to determine significance with a 95% confidence interval for the complications, while an unpaired T-test assessed significance for EBL.

Result

A significant difference was seen between SLA and TLA patients regarding overall complications in both short and long-fusion groups. TLA Patients undergoing long fusion have three times the odds of developing hardware failure in general; specifically, they have 5.12 times the odds of developing ASD than patients with SLA undergoing long fusion. TLA patients have 5.57 times the odds of developing

general hardware complications and 5.59 times the odds of developing ASD. However, there were no significant differences for all other variables. Interestingly, a significant difference in EBL was noted between TLA and SLA patients in the short fusion group.

Conclusion

This study indicated a significant increase in overall complications experienced by patients with TLA undergoing MIS-ATP. While it is difficult to predict the development of ASD, it is important to note that patients with transitional anatomy may be at higher odds of requiring revision surgery or extension of hardware from prior lumbar fusion. All patients were informed about the risks of minimally invasive lumbar fusion; however, it may be pertinent to inform patients with transitional anatomy about the increased risk of developing ASD and the resulting recurring pain. The difference in rates of ASD may be due to hypermobility in vertebrae adjacent to the lumbosacral junction and changes in load bearing posed by transitional anatomy. Despite a prior study indicating no significant difference in blood loss between TLA and SLA patients, our results indicated otherwise for patients undergoing short fusion lumbar surgery, highlighting a subject for future research.

19. SUCCESSFUL OUTCOME OF TREATING SPINAL ABC WITH DENOSUMAB IN A PEDIATRIC PATIENT: A CASE REPORT AND LITERATURE REVIEW

Mohammed Alrushud

Introduction

In this paper, we presented an 8-year-old girl with spinal ABC secondary to osteoblastoma at the level of C3. The patient is not a candidate for complete surgical resection of the mass due to its proximity to the vertebral artery. At our center, we opted to treat this patient with denosumab, which has been reported to have a successful outcome as an off-label treatment for ABC in both adult and pediatric populations. Unfortunately, there are not well-established guidelines for the treatment of ABCs with denosumab in terms of dosage, frequency, or length of treatment.

Methodology

All Pubmed indexed papers since 2010 were reviewed for reports of patient outcomes following a denosumab treatment regimen. We reviewed each patient in terms of demography, clinical presentation, regiment, outcome, recurrence, and adverse effects.

Result

Unfortunately, there are not well-established guidelines for the treatment of ABCs with denosumab in terms of dosage, frequency, or length of treatment. Our literature review found that most reported cases of adults used the same protocol for Giant Cell Tumors (GCTs). In pediatric patients, the recommended protocol consisted of sc 70 mg/m2 weekly for one month as a loading dose followed by monthly doses. Most pediatric patients were treated for 12 months, but symptomatic improvement was reported in some papers as early as three months following initiation of treatment.

Conclusion

From our literature review and the successful outcome of our case, we believe that denosumab has the potential to be an important tool for spine surgeons in the treatment of ABCs. This is especially true for complex patients with tumors unamiable to surgical resection due to location or proximity to vital structures, such as in this case. However, further

research is warranted to further illustrate the efficacy of denosumab therapy for ABC and to establish an ideal regimen that would take into account the risks and benefits of the treatment.

20. AO SPINE UPPER CERVICAL INJURY CLASSIFICATION SYSTEM: A DESCRIPTION AND RELIABILITY STUDY

Waeel Hamouda

Introduction

Prior upper cervical spine injury classification systems have focused on injuries to the craniocervical junction (CCJ), atlas, and dens independently. However, no previous system has classified upper cervical spine injuries using a comprehensive system incorporating all injuries from the occiput to the C2–3 joint. The purpose of this study was to determine the accuracy of experts at correctly classifying upper cervical spine injuries based on the recently published AO Spine Upper Cervical Injury Classification System to determine their inter-observer reliability and to identify the intra-observer reproducibility of the experts.

Methodology

This international Multi-Center Survey involved thirteen international AO Spine Knowledge Forum Trauma members participated in two live webinar-based classifications of 29 upper cervical spine injuries presented in random order, four weeks apart. Percent agreement with the gold standard and kappa coefficients (□) were calculated to determine the interobserver reliability and intraobserver reproducibility.

Result

Raters demonstrated 80.8% and 82.7% accuracy in the identification of the injury classification (combined location and type) on the first and second assessments, respectively. Injury classification intraobserver reproducibility was excellent (mean, [range] □=0.82 [0.58-1.00]). Excellent interobserver reliability was found for injury location (□ = 0.922 and □=0.912) on both assessments, while injury type was substantial (□=0.689 and 0.699) on both assessments. This correlated to a substantial overall interobserver reliability (□=0.729 and 0.732).

Conclusion

Early phase validation demonstrated the classification of upper cervical spine injuries using the AO Spine Upper Cervical Injury Classification System to be accurate, reliable, and reproducible. Greater than 80% accuracy was detected for injury classification. The intraobserver reproducibility was excellent, while the interobserver reliability was substantial.

21. VIRTUAL SCOLIOSIS-SPECIFIC EXERCISES (SEAS) WITH HOME-BASED APPLICATION OF KINESIO TAPING VERSUS CLINICAL-BASED ROUTINE PHYSIOTHERAPY FOR ADOLESCENTS WITH MODERATE ADOLESCENT IDIOPATHIC SCOLIOSIS

Ameer Almubarak

Introduction

Clinical physiotherapy practice has several exercise protocols for adolescent idiopathic scoliosis (AIS). However, there is a need for comparable

studies on the effectiveness of different exercise interventions based on delivery mode. Our previous study compared virtual scoliosis-specific self-exercise (SEAS) with routine clinical-based spinal stabilization and stretching exercises. This study compared the combination of Virtual SEAS and pre-cut, parent-applied kinesio taping (KT) with clinical-based core stretching/stabilization exercises. We assumed that presenting SEAS virtually via phone calls or social media apps with self/parent taping would increase adherence to exercise and minimize potential adverse events for adolescents who complained of idiopathic scoliosis.

Methodology

Twenty-two males with AIS with moderate curves (less than 45 degrees) were randomly divided into two groups. In addition to wearing a brace for 12 weeks, one group received clinical-based core stretching/stabilization exercise and home instructions to continue exercise, while the other group received a combination of Virtual SEAS in the form of phone calls, recorded video clips, or live chat in Zoom or WhatsApp. Clips contained scientific exercise approaches to scoliosis exercise therapy in addition to pre-cut, parents applied KT. There was no physical attendance in physiotherapy, and all instructions and support were delivered electronically. The outcome measures were based on Cobb angle measured via upright x-ray, Risser's sign, and quality of life.

Result

Cobb angles and Risser signs improved for both groups. However, it was slightly better for the routine physiotherapy group. Quality of life slightly changed in both groups. The pain domain of the Scoliosis Research Society (Sr-22) questionnaire improved in both groups.

Conclusion

Those who attended physiotherapy sessions showed slightly better improvement. The Virtual SEAS showed effectiveness in reducing Cobb angle. The improvement was relatively small. We concluded that a combination of both Virtual SEAS and KT should support but not replace routine physiotherapy for adolescents with Idiopathic scoliosis.

22. CLINICAL OUTCOMES OF THE TRANSFORAMINAL LUMBAR INTERBODY FUSION TECHNIQUE AMONG PATIENTS WITH LOW BACK PAIN SHOWING TYPE 1 MODIC CHANGES ON MRI

Yazed Alharbi

Introduction

The unilateral transforaminal lumbar interbody fusion (TLIF) is a different surgical method, that circumvents both the anterior method and the method via the spinal canal. Due to the lack of literature available for clinical outcomes and consequences post-TLIF, this study aimed to assess the clinical outcomes of the TLIF technique among patients with low back pain showing type 1 Modic changes on MRI.

Methodology

A cross-sectional study was conducted between January 2019 and March 2021. All patients included in the study had Modic type 1 changes and disabling lower backs as the main complaint and/or leg pain. Data were collected on variables such as age, body mass index (BMI), gender, and other risk factors like diabetes mellitus, steroid use, and smoking. Pain intensity was evaluated using a visual analog scale (VAS) before and after surgery. A radiographic

evaluation was also performed. Pre- and post-operative pain scores and differences in disc height were assessed using the Wilcoxon rank sum test. A P-value of less than 0.05 was considered significant.

Result

The mean length of stay at the hospital was 4.3 days, with an SD of 1.61. The mean pre-operative lower back pain score was 8.78, with an SD of 0.79. The mean post-operative score was substantially lowered to 0.83 with an SD of 0.7. There was a significant difference between pre-operative and post-operative lumbar pain (P-value < 0.001). There was a significant increase in mean disc height from pre (7.14mm) to postoperatively (11.02 mm) and at one year (10.21 mm) with a P-value of <0.001. 82.14% of the patients had no complications, and 3.57% each had either delayed wound healing without any infection or there was transient post-operative radiculopathy that improved in 6 weeks.

Conclusion

The Transforaminal Lumbar Interbody Fusion (TLIF) procedure can be considered a safe procedure to provide anterior and posterior column support by adopting a unilateral posterior approach. The outcomes were favorable in terms of no prolonged length of stay, less blood loss, no mortality, reduction in the severity of pain, and improvement in disc height. However, the appropriate selection of patients for this technique is pivotal for the success of the procedure.

23. EFFECTS OF SHORT-TERM SPACE TRAVEL ON SPINAL HEALTH: INSIGHTS FROM AN MRI STUDY ON ASTRONAUTS

Rakan Bokhari

Introduction

As space tourism becomes increasingly accessible to the general public, it becomes necessary to better understand the effects of microgravity on the human body. Lower back pain (LBP) is one of the most commonly encountered complaints in the general population, and its prevalence increases with age. LBP is also a very frequently encountered complaint reported by astronauts, both during space travel and after their return to Earth. Characterizing the changes in the spinal column and the underlying mechanisms will help better understand the effects of microgravity on the human spine and may provide therapeutic or prophylactic venues. However, not much is available on the biochemical changes in the IVD with space travel.

Methodology

We enrolled two astronauts recruited for a 17-day space mission. They were imaged pre-flight, as well as immediately post-flight, and at 3 months. Lumbar IVD water and glycosaminoglycan (GAG) content was assessed using DIXON water-only phase and T1rho MRI imaging modalities.

Result

Heterogeneous changes were seen in the IVDs and PSM of both astronauts. One astronaut saw decreased water and GAG content, while the opposite was seen in the other. These changes in the IVD with space flight appeared correlated to the extent of baseline degeneration. In the case of PSMs, changes in volume and fatty infiltration were also heterogeneous between astronauts. Interestingly, changes did not yet stabilize at the last follow-up time point of 3 months.

Conclusion

This work adds to the growing body of evidence demonstrating a deleterious effect of even short periods of space travel on spine health. We demonstrated that even short periods of microgravity were associated with biochemical changes believed to underlie disc degeneration. In addition, we showed that these changes may continue to progress beyond 3 months after their return from space.

24. SHOULDER LEVEL CHANGES AFTER MINIMALLY INVASIVE ANTERIOR TO PSOAS (ATP) FUSION IN ADULT SCOLIOSIS PATIENTS

Henry Hojoon Seo

Introduction

Post-operative shoulder balance is one of the most important post-surgical outcomes determining the success of scoliosis correction surgery. Minimally invasive antepsoas (MIS-ATP) fusion provides anterolateral access to the lumbar spine, allowing for safe anterior lumbar interbody fusions with significant manipulation and correction of spine deformity. To date, there is limited literature on the effectiveness of the MIS-ATP approach on shoulder-level correction for adult scoliosis patients. The purpose of this study was to evaluate shoulder level changes in adult patients following spine deformity correction via the MIS-ATP approach.

Methodology

This retrospective cohort study involved adult patients who underwent minimally invasive antepsoas (MIS-ATP) fusions for scoliosis in our university surgical center. Patients who had surgeries between January 2008 and February 2023 and have both pre-operative and post-operative (at least six months) scoliosis studies were reviewed. Shoulder correction was measured via shoulder height changes and clavicle angle changes.

Result

A total of 58 patients (mean age 51.6, 27.6% male) were included. The average pre-operative shoulder height was 12.48mm, with a clavicle angle of 2.65 degrees. There was a significant change in the post-op shoulder levels, with average shoulder height of 7.59 mm and clavicle angle of 1.71 degrees (t-test, $p < 0.005$). 74.1% of patients demonstrated correction in post-op shoulder level. 19.0% of cases had worsening shoulder imbalance on the same side (> 5mm), while 6.9% of patients had overcorrection, leading to a worse imbalance in the opposite direction (> 5mm).

Conclusion

A significant correction in shoulder level was found for adult patients who had scoliosis correction via MIS-ATP fusion. The MIS-ATP approach could potentially provide an effective solution for scoliosis correction procedures that lead to shoulder-level balance.