



Lumbosacral Disc Disease Reviews

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BACK PROBLEMS



PRP for Osteoarthritis Reviews

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SOME THINGS
JUST FILL YOUR
HEART WITHOUT
TRYING.



Things to learn...

Doing these literature reviews are always very interesting. To go through a whole paper, there is the background information (to get everyone up to speed), the materials & methods (which are important to be able to replicate a study or a result), of course the results & discussion of such, but as a non-researcher it can be hard to pick out where to start in analyzing a paper.

So my goal in completing these research reviews is to boil down the papers into the parts that would interest a clinician. Then of course to add my 2 cents at the end – Relevance to Rehab (aka Why you care!). I hope you find the selections interesting and useful! And if you have topic suggestions, just drop me a line!

Cheers! Laurie Edge-Hughes

Lumbosacral degenerative stenosis in the dog. The results of epidural infiltration with methylprednisolone acetate: a retrospective study.

L. Janssens; Y. Beosier; R. Daems
Vet Comp Orthop Traumatol 2009; 22: 486–491



Introduction: Refer to Video Training 92 & 93 for background information on Lumbosacral Stenosis.

This retrospective study sought to describe the clinical outcome of dogs that underwent an injection of methylprednisolone into the epidural space using C-arm fluoroscopic guidance. The goal was to place the anti-inflammatory drug directly onto the inflamed area. Methylprednisolone acetate is a slow release corticosteroid with an elimination half-life of 139 hours. Based on the results of studies of humans, the researchers hypothesized that the injection technique could be clinically valuable and possibly yield results comparable to those reported for surgical outcomes.

Materials and Methods: This study collected patient data over a six-year period. All clinical cases referred to the clinic that were diagnosed with lumbosacral degenerative stenosis (LSDS) and that fulfilled the selection criteria, were treated with epidural infiltrations. 38 dogs were included in the study, with re-evaluation of clinical signs, and an epidurogram performed at each consecutive examination and treatment. Dogs

were not specifically tested for instability of the lumbosacral vertebral bodies during radiographic examination. All dogs were sedated and epidurally infiltrated with a 40 mg/ml concentrated form of methylprednisolone acetate and fluoroscopic guidance.

The protocol consisted of a suggested minimum of three infiltrations: the first on day one, the second two-weeks later (between 12 and 16 days) and the third six weeks after day one (between 40 and 50 days). More than three infiltrations were administered on owner demand, based on the subjective evaluation of clinical relapse, with a minimum interval of 12-weeks between each infiltration. If the relapse was shorter than three months, epidural infiltration was discontinued as a treatment. After infiltration, rest was not prescribed and no additional medications were administered.

Owners were sent one follow-up questionnaire mailed after the first infiltration, to gain information on the results of epidural infiltration.

Results: Dogs exhibited clinical signs on an average of 19.4 months

before the first epidural infiltration. Clinical effects of epidural infiltration were reported one to four days after epidural infiltration, while early side effects were reported in the same period by 50% of the owners. All side effects were temporary, lasting a maximum of five days, and usually for only one to two days.

As a rule, owners reported the duration of effect after the first epidural infiltration to be shorter than the requested interval of two weeks, ranging from 4 to 14 days. All dogs showed clinical amelioration. Seven dogs underwent only one infiltration. After the second epidural infiltration, the duration of effect was four to six weeks, with a median of 32 days. All dogs showed clinical amelioration. Seven dogs underwent only two infiltrations. The median duration of effect after three initial infiltrations was 4.5 months. All dogs showed amelioration. The median interval between epidural infiltration, after the first three initial infiltrations, in those animals that relapsed and continued treatment, was 5.3 months. Twenty-four dogs underwent at least three infiltrations, and 10 of

Continued...

them had more than three infiltrations.

At the end of the assessment, 30 owners reported amelioration of the clinical signs in their dogs following infiltration. There was a significant amelioration of the clinical signs as described by the owners when they compared these with the period before epidural infiltration.

Discussion: Each of the dogs had been treated for several weeks or months before they were included in the epidural infiltration protocol. However none had shown acceptable clinical results according to the owners. This study showed that about 79% of the dogs benefited from the treatment and 53% were considered to be cured. A control group was not used and as such, one could argue that placebo treated dogs could show similar improvements. The dogs that had unfavourable clinical outcome after epidural infiltration treatment were still potential surgical candidates.

Typical conservative treatment for dogs with LSDS consists of rest and anti-inflammatory medication. Amongst these various non-surgical therapies, it has been proven that paracetamol (aka Tylenol) and different anti-inflammatory medications are efficient and function better than placebo.

The results from epidural infiltration as described in this study are comparable to those of dorsal decompressive surgery in dogs. In general, about 50% of the dogs were considered to be cured following surgery, while about 20 to 40% were considered to have improved. Also, success rates after surgery tend to decrease with time. It should be noted that the surgical therapy was often combined with a long period of rest and anti-inflammatory therapy. This combination of adjunctive therapy was not prescribed with the epidural infiltration-treated patients in this study.

The clinical results of corticosteroid epidural infiltration with rapid amelioration of clinical signs in most patients and a long-term recovery rate is, in our opinion, because mechanical compression of the



cauda equina and the nerve roots is only partially responsible for the clinical signs. Mechanical thinking about LSDS implies that compression of nerve roots and the cauda equina by disc material is responsible for the clinical signs, and thereby removal of this compression should lead to cure. Pathological studies of humans and dogs have, however, revealed a large number of individuals with disc protrusions with nerve compression that have never had clinical signs or symptoms. Also, many positive diagnoses of lumbosacral disc protrusions were made by radiographic, computed tomographic or magnetic resonance imaging in asymptomatic humans and dogs. Therefore the general consensus is that there is often a poor association between clinical signs, pathology and imaging findings in this disease.

If mechanical compression is not the sole causative component in all cases of LSDS, the second is inflammation. Once the inflammatory nature of LSDS in humans was understood, it was a short logical step to deposit a potent, anti-inflammatory drug at the inflamed location. Therefore, epidural infiltrations with long-acting corticosteroids, and eventually in combination with bupivacaine, became the most widely used infiltration technique in humans.

In conclusion, the authors believe that epidural infiltration treatment of LSDS is a safe and well accepted treatment that seems to achieve clinical results comparable to those of decompressive surgery, and which warrants further blinded investigation.

REHAB IMPLICATIONS:

I have passed this paper on to different vets in my area as a thought to consider if my conservative rehab therapy failed to work or be as effective as could be. I think too that combining our rehab therapeutics - and in particular manual therapies and potentially laser & shockwave, could have additional benefits.

- LEH

Lumbar paraspinal muscle transverse area and symmetry in dogs with and without degenerative lumbosacral stenosis.

A. L. Henderson, S. Hecht and D. L. Millis

Journal of Small Animal Practice (2015) 56, 618–622

Introduction: Degenerative lumbosacral stenosis (DLSS) is the most common pathologic condition of the lumbar vertebral column in dogs. It is a multifactorial degenerative condition that causes compression of the nerve roots composing the lumbosacral trunk and associated signs of pain and neurological dysfunction referred to as “cauda equina syndrome”. Intervertebral disc degeneration at L7-S1, structural abnormalities, and/or activity-related stress is thought to contribute to instability within the intervertebral motion segment, and plays a role in the pathogenesis of DLSS. A continuous cycle of pain and neurologic dysfunction occurs because of compression and compromised blood supply to the nerve roots.

German shepherd dogs and highly-active or working dogs appear to be particularly susceptible to DLSS. Facet joint orientation and asymmetry in the German shepherd dog affect the biomechanics at the lumbosacral joint and may contribute to increased strain with a given level of activity and disc degeneration in this breed. History may include pelvic limb lameness and pain/difficulty rising from recumbency, climbing stairs or jumping. In humans, chronic low back pain is associated with lumbar paraspinal muscle atrophy and

asymmetry. Several studies have identified selective, significant atrophy of the lumbar multifidus muscle in these human patients. The lumbar multifidus is thought to be the most important muscle for lumbar segmental stability in humans, because it is the largest paraspinal muscle in the region with the most medial location, flanking the spinous processes. The multifidus contributes the most of all the muscle groups to stability and control of neutral zone movement in the vertebral column.

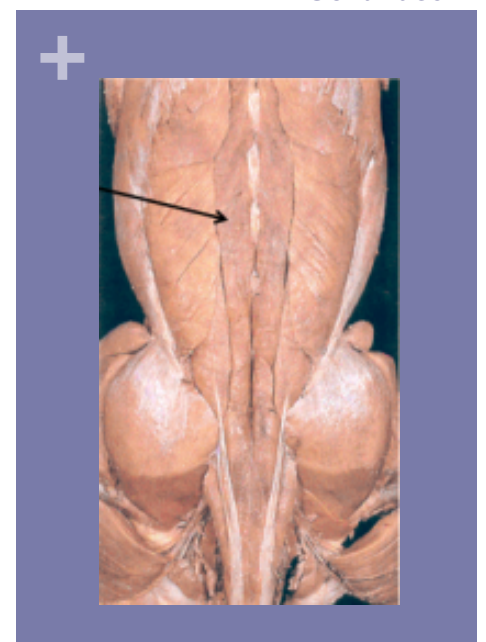
Despite obvious differences in posture between bipeds and quadrupeds, humans and dogs share several spinal biomechanical characteristics, including similarities in axial compressive loads and in the pathogenesis of disc degeneration in non-chondrodystrophic breeds. DLSS in dogs results in localized and/or nerve root signature pain and neurological dysfunction similar to chronic low back pain in people. Furthermore, paraspinal muscle atrophy may also be a shared characteristic between humans and dogs with DLSS. The purpose of this study was to investigate whether there is a difference in lumbar paraspinal musculature between dogs with DLSS and those without DLSS. The authors hypothesised that mean muscle transverse area would be lower and asymmetry indices would be higher

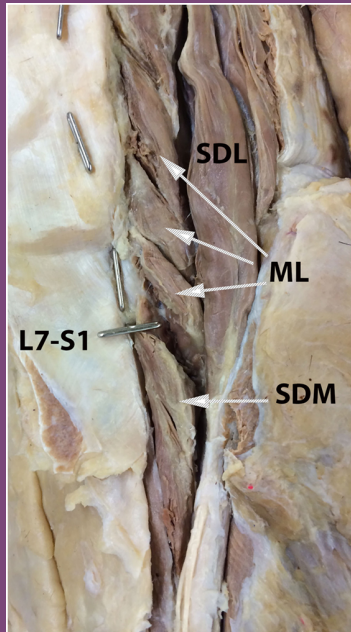
in dogs with DLSS than in those without.

Methods: Patient records from the University of Tennessee Veterinary Teaching Hospital were extracted from a cohort of client-owned dogs receiving MRI scans from April 2008 to February 2012.

Dogs with clinical signs of pain and neurologic dysfunction localized to the lumbosacral junction and supporting MRI evidence of compromise of the spinal canal and/or nerve roots of the cauda equina were included in the DLSS group. In addition, transverse images of L7-S1 were collected from an equal number of control dogs undergoing brain, cervical or thoracolumbar (cranial to L4) MRI procedures for other reasons. Control

Continued...





dogs met the age and weight criteria and did not have clinical signs of lumbosacral pain nor neuro-localisation caudal to L4. Control patients underwent MRI studies for reasons not expected to affect lumbar paraspinal muscle properties. Chondrodystrophic breeds and dogs younger than 4 years were not included.

A commercial picture archival and communication system was used for image viewing and measurements. Measurements were made by a single investigator. Images were measured in the order in which patients received MRIs, and patient medical record numbers were used for identification to minimise observer awareness of study group assignment for each case.

Results:

Eighteen dogs (nine DLSS and nine control) were included in the study. All dogs in the study were pets, with the exception of two working dogs in the DLSS group. Muscle to L7 transverse area ratio & Mean muscle-to-L7

transverse area ratios for the lumbar multifidus and sacrocaudalis dorsalis lateralis were significantly smaller in the DLSS group than the control group.

There was greater asymmetry in the DLSS group for both lumbar multifidus and sacrocaudalis dorsalis lateralis than the control group. The symmetry differences were not statistically significant between these sampled populations.

Discussion: This study demonstrated significantly decreased lumbar multifidus and sacrocaudalis dorsalis lateralis muscle transverse area in dogs with DLSS. In addition, these dogs with DLSS exhibited increased side-to-side asymmetry for both muscle groups. A separate unrelated study has postulated that reduced activation of paraspinal muscles, leading to disuse atrophy, may be caused by pain-guarding behaviour, reflex inhibition or inflammation in affected humans. Furthermore, several studies have demonstrated improvement and/or reduced recurrence of chronic low back pain and increase in muscle size in people in response to exercises targeting active deep lumbar stabilizers including multifidus lumborum.

Spinal pain, including LS pain caused by DLSS, has been suggested to be the third most common reason for working dog death or euthanasia. A number of surgical interventions have been performed in an effort to treat

cauda equina compression and/or instability that may occur with DLSS. Traditional methods of rest, systemic analgesic and/or local corticosteroid administration have been recommended as first-line therapies in dogs as in humans with low back pain with some evidence for short-term success. However, these treatments do not address any underlying mechanisms, a specific diagnosis of DLSS may not have been achieved in some cases, and long-term efficacy is questionable compared to surgical approaches.

Inconsistencies between imaging and clinical findings and paucity of objective outcome measures exemplify major challenges in the diagnosis and management of DLSS. Dogs that are mildly affected may benefit from paraspinal muscle strengthening if atrophied muscles with abnormal activation patterns contribute to the clinical manifestations of pain and dysfunction for dogs with DLSS. It is currently unknown whether a muscle strengthening programme targeting the deep lumbar stabilizing muscles would increase muscle area and symmetry and reduce pain and dysfunction in dogs with mild DLSS, as has been recognized in people with chronic low back pain.

This evaluation was intended as a pilot study to determine the value of measuring paraspinal muscle area and symmetry in

Continued...

dogs with and without DLSS. Results from this sample population suggest that dogs with DLSS have smaller lumbar multifidus and sacrocaudalis dorsalis muscles than control dogs, and that MRI may be useful as a tool for quantifying these differences. Establishing alterations in lumbar paraspinal muscle size and symmetry as characteristics of dogs with DLSS may improve the understanding of the pathogenesis of this disease, and lead to determination as to whether paraspinal muscle alterations play an etiological or consequential role. Further studies are required to determine whether these differences are repeatable in a larger and more standardized population of dogs, and to evaluate response of these changes to therapeutic interventions for dogs with DLSS.

RELEVANCE TO REHAB

This is baseline research. In other words, this is a study replicating what is already known in humans (and horses I will add), and is seen clinically by those in 'the field', but has not been studied in dogs. Essentially it satisfies the 'nay-sayers' that decree, "We don't know if it's the same in dogs as it is in people." But now we can say "yes it is"! As such, the next stepping-stone is to employ treatment techniques that work in these other species (humans in particular, because there is an abundance of research and clinical knowledge there) to the canine patient. It's what we do already, but research is on it's way to helping validate us!



Baby talk vs Doggie talk?

Mitchell (2001) decided to compare how people talk to infants with how they talk to dogs. He found both similarities and differences:

Similarities: high-pitched voice, repetitive use of grammatically acceptable words, present-tense verbs.

Differences: Dog-talk involved shorter sentences and more orders while baby-talk included more questions.

Multiple Injections of Leukoreduced Platelet Rich Plasma Reduce Pain and Functional Impairment in a Canine Model of ACL and Meniscal Deficiency

J.L. Cook, P.A. Smith, C.C. Bozynski, K. Kuroki, C.R. Cook, A.M. Stoker, F.M. Pfeiffer
J Orthop Res, 2016 34(4): 607 – 615.

Introduction: There is now convincing evidence for the safety and efficacy of Platelet Rich Plasma (PRP) as an intra-articular injection for the treatment of osteoarthritis. In studies evaluating human patients undergoing ACL reconstruction, PRP treatment has been reported to be associated with improved graft maturation, better synovial coverage, greater graft width and higher graft tension. However, no improvements in clinical outcomes or bone-tendon healing were noted. Similar to the ACL, direct effects of PRP on meniscal healing are likely dependent upon sustained local delivery of bioactive factors to the repair site. As such, a scaffold for PRP delivery and residence at the meniscal defect is thought to be advantageous for promoting tissue repair, whereas intra-articular injection of PRP alone may be sufficient for producing menisco-protective effects. Encompassed within the goals for treatment of ACL and meniscal pathology is the

overriding objective for preservation of whole-joint health and prevention or retardation of the development and progression of OA.

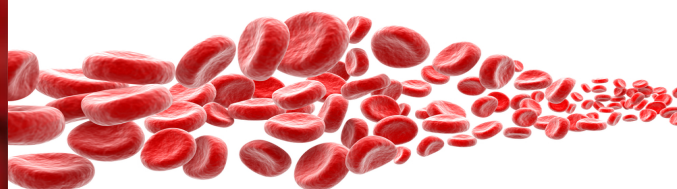
Therefore, pre-emptive intra-articular injection of PRP may have significant benefits for patients with ACL and/or meniscal injuries in terms of tissue healing and prevention of post-injury OA. To the authors' knowledge, intra-articular injection of leukoreduced PRP to treat ACL and meniscal tears without repair or reconstruction—and ameliorate the development and progression of osteoarthritis—has not been reported in the peer-reviewed literature. The objective of this study was to determine the effects of multiple intraarticular injections of a leukoreduced PRP on ACL healing, meniscal healing, and amelioration of OA in a canine model. This study hypothesized that multiple intraarticular injections of a leukoreduced PRP significantly reduce pain, improve functional limb use, promote ACL and

meniscal repair, and ameliorate progression of OA compared to saline injections.

Materials and Methods: Adult purpose-bred research hounds underwent this procedure. Standard cranio (antero) lateral and anteromedial portals were established in the right knee to perform partial transection of the ACL and meniscal release. The left knee served as an unoperated control.

At weeks 1, 2, 3, 6, and 8 after surgery, dogs were sedated for aseptic intra-articular injection of the right knee in an effort to investigate a maximal number of clinically feasible injections. The dogs were divided into two groups: PRP (2mL) or saline injections.

Orthopedic examination by a board-certified veterinary orthopaedic surgeon who was blinded to treatment was performed on each dog prior to inclusion in the study. All limbs and joints were assessed clinically and radiographically to ensure that no pre-existing orthopaedic



disorders were evident. The following outcome measures were performed pre-operatively, prior to first treatment, and at 1, 2, 6, 12, 18, and 24 weeks after first treatment; stifle comfortable range of motion using a goniometer, clinical lameness scores, knee pain and effusion, as well as gait analysis kinetics.

Pre-operatively, prior to first treatment, and at 12 and 24 weeks post-treatment, anteroposterior, and mediolateral radiographic views of the operated knee of each dog were obtained and assessed by one board-certified veterinary radiologist, blinded to the experimental design, using a modified subjective scoring system. Prior to treatment and at 12 and 24 weeks after first treatment, arthroscopic assessment of the right knee of each dog was performed.

At 24 weeks after first treatment, dogs were humanely euthanized and the stifle joints were inspected, tested, and scored.

Results:

Comfortable PROM (CROM), Pain, and Effusion

The difference in CROM between hindlimbs for each dog was used for comparison between groups. Dogs in the Saline group had significantly greater loss in CROM compared to ACP dogs beginning 1 week after treatment and at each assessment time point throughout the 6-month post-treatment study period. Dogs in the Saline group had significantly more pain in the affected knees compared to ACP dogs beginning 1 week after treatment and at each assessment time point throughout the 6-month post-treatment study period. There were no statistically significant differences in degree of effusion in the affected knees at any assessment time point throughout the 6-month post-treatment study period.

Lameness, Function, and Kinetics

Dogs in the Saline group had significantly more severe lameness in the affected hindlimbs compared to ACP dogs at 5, 12, and 18 weeks after treatment. Dogs in the ACP group had significantly higher function in the affected hindlimbs compared to Saline dogs at 5, 12, and 18 weeks after treatment. Dogs in the ACP group had significantly higher %



Canis Osteoarthritis.

total pressure index in the affected hindlimbs compared to Saline dogs at 5, 12, and 18 weeks after treatment. No other statistically significant differences were noted throughout the study period.

Radiographic Scoring

Radiographic pathology was noted in all dogs prior to treatment in the form of moderate to severe effusion. Severity of radiographic OA increased significantly over time within each group, however, no statistically significant differences were noted between groups at any time point.

Arthroscopic Assessments

One week after partial ACL transection and medial meniscal release, and prior to treatment, the operated joints of all dogs showed very consistent pathologic findings of synovitis, retraction, and remodeling at the ACL transection site, and complete subluxation of the medial meniscus.

Twelve weeks after treatment, knees treated with ACP injections also showed medial compartment cartilage loss as well as knees treated with saline, but the synovitis was less severe compared to those

treated with saline, and five of six knees showed evidence of repair tissue at the site of ACL transection. Six months after treatment, knees treated with ACP injections also showed medial compartment cartilage loss with less severe chronic synovitis compared to those treated with saline, and five of six knees showed evidence of repair and remodeling at the site of ACL transection with one showing disruption of the anteromedial band of the ACL with associated vascular and synovial proliferation.

Biomechanical Testing

Although, ACL strength and stiffness in ACP-treated knees were numerically higher and closer to controls than in Saline-treated knees, none of the differences in material properties were statistically significant.

Histology

Based on whole-joint histologic assessments, synovial pathology was more severe in the Saline group, however, the difference was not statistically significant. ACL pathology was significantly less severe in ACP-treated knees compared to Saline-treated knees.

Discussion: The results of this study allow us to accept the hypothesis that multiple intra-articular injections of a leukoreduced PRP would significantly reduce pain, improve functional limb use, and promote ACL repair, however, we must reject the hypothesis that these injections would promote meniscal healing and ameliorate progression of OA compared to saline injections.

Interestingly, the beneficial effects of PRP on knee range of motion and pain were noted 1 week after initiation of treatment and maintained throughout the 6-month study period. In contrast, the beneficial effects of PRP on lameness, function, and kinetics were not realized until 5 weeks after initiation of treatment and were no longer significantly different at the end of the 6-month study period.

In conjunction with the radiographic, arthroscopic,

and histologic findings with respect to development and progression of OA, these data suggest that mechanisms associated with the beneficial effects of PRP seen in this study are primarily related to its anti-inflammatory, analgesic, and viscoelastic effects rather than any direct effects on tissue anabolism or catabolism.

Conclusions: The results of the present study suggest that five intra-articular injections of leukoreduced PRP over the first 8 weeks following partial ACL transection and meniscal release had beneficial effects for ACL repair (in a partially-torn model), improved range of motion in the knee, decreased pain, and improved limb function for up to 6 months in a pre-clinical canine model. Based on these findings, we concluded that leukoreduced PRP has potential benefits in promoting ACL healing and treating symptoms associated with knee OA. We are now working to optimize a clinically applicable strategy for use of PRP in treating patients with ACL injuries.

REHAB IMPLICATIONS

So I am not as impressed with this result as I was hoping to be! Given the cost and need for sedation for PRP injections, I would think that rehab therapies alone could yield as good or better outcomes than PRP injections. Our therapies HAVE been shown to have beneficial effects on cartilage in addition to tissue healing (laser, ultrasound, shockwave, manual therapies, & PEMF). So while this is 'interesting', I think that I would instead advise owners to put their money towards more physiotherapy / rehabilitation treatments as compared to PRP. My biased 2 cents anyways! - LEH



Adipose-derived mesenchymal stem cells and platelet-rich plasma synergistically ameliorate the surgical-induced osteoarthritis in Beagle dogs

S. Yun, SK Ku and YS Kwon, *J Orthop Surg Res* (2016) 11:9

Background:

Osteoarthritis (OA) is the most common clinical syndrome of joint pain and dysfunction, accompanied by varying degrees of functional limitation and the reduced quality of life. The most ideal treatment of OA is focused on blocking the catabolic activity of cartilage and enhancing regeneration of normal cartilage. Common therapies focus on relief of pain and discomfort, improvement in function, and prevention of further degeneration. The primary approach usually involves NSAIDs, analgesics, and hyaluronan, which allows the brief symptomatic relief but provides no apparent disease-modifying effect. Therefore, there is a critical need for the development of the alternative agents that can fundamentally prevent the destruction of cartilages or stimulate its proper

repair. In these aspects, various efforts have been tried to search for the effective cartilage-preserving methods with cell sources.

To sum up, the isolated chondrocyte expansion and implantation method is regarded as the fundamental solution. However, the main concern of the most cultured chondrocytes is losing the characteristics of producing hyaline-like cartilage. In a canine model, it has been reported that cultured autologous chondrocytes failed to return to the normal hyaline cartilage. In human, the intra-articular injection of 1.0×10^8 cells of adipose-derived mesenchymal stem cell (MSC) could improve the function, reduce the pain, and regenerate the hyaline-like cartilage. MSCs are typically not observed in synovial fluid. However, MSCs appear in synovial fluid in the OA condition, and they are thought to play an important role in the regeneration of damaged tissue and have anti-inflammatory effect. For these reasons, it is believed that the direct administration of MSCs could promote the positive role of them by preventing their

depletion and improving cartilage regeneration.

The platelet-rich plasma (PRP) has typically four- to eightfold more platelets than the normal plasma. PRP has various growth factors such as platelet-derived growth factor and transforming growth factor beta. It has been well known that PRP has angiogenic, antiinflammatory, and anti-catabolic effects. It has also been reported that transforming growth factor beta and fibroblast growth factor from PRP have an anabolic effect on cartilage metabolism. These factors not only regulate the cell migration and proliferation but also enhance the wound healing and extracellular matrix (ECM) remodeling via the stimulation of angiogenesis.

Based on the previous studies, it is hypothesized that the PRP could have a synergistic effect on the cartilage regeneration with the combination of MSCs. Therefore, the purpose of this study is to examine the effect of PRP and MSCs on the morphologic change and regeneration of articular cartilage in the inflammation process using canine OA model.

Methods:

Autologous PRP was prepared in each dog using double spin method. The collected plasma (PRP) was tested using complete blood cell



count test to make sure it had 1.0×10^6 platelets/ μl or more. All prepared PRP in this study were used within 6 h.

Adipose-derived mesenchymal stem cell isolation and culture was done with fat tissue aseptically collected from the flank of a dog.

Twenty-four physically healthy Beagle dogs were used in this experiment. Under the anesthetic state, the cranial cruciate ligament of a right hind limb was excised, and the connective tissues and skin were sutured with routine procedure. Analgesics and antibiotics were administrated for 3 days after the surgery. After a week for soft tissue healing, each dog regularly walked for 10 min per day for 2 months. Then, treatment was given every week for 1 month. Another 2 months later, the dogs were sacrificed and stifle samples were collected.

After the canine OA model, the subjects were treated every week for 1 month with an intra-articular injection with each material according to the groups: the control group with 1 ml of saline, the PRP group with 1 ml of PRP, the MSC group with 1.0×10^7 MSCs in 1 ml of saline, and the MSC and PRP co-treatment (MP) group with 1.0×10^7 MSCs in 1 ml of PRP. The contralateral stifle joint of the dogs in control group were used as a sham group in a histopathological examination, and no treatment material was given.

The lameness score was measured before the surgery and by every

month after the surgery. All dogs had normal gait and no lameness before surgery. As a blind test, three veterinarians assessed the grade of lameness.

To condense the remainder of this section, suffice to say the cartilage / meniscal tissues were subjected to many tests.

Results:

Although the lameness score in the MP group was decreased compared to those in the other groups, there were no significant changes between groups. The lameness score was significantly decreased at 2 months and at 3 months after treatment in the PRP group and MP group when compared with the previous treatment, respectively.

The focal compressive strength of the femoral and tibial articular surface cartilages were significantly decreased in the control group as compared to that of the sham group. However, the focal compressive strength significantly increased by the treatment of all three test materials. In MP group, the focal compressive strength was higher than those in any other treated groups. The thickness of articular cartilages was higher in the MSC and PRP than control group. The more favourable effect on the articular surface was examined in MP group, compared to those of MSC and PRP groups.

The contents of collagen and GAG as the main component of extra cellular matrix were significantly decreased in control

group compared with those of sham group, but it was significantly increased in all treated groups compared with control group.

The increase of cell proliferation on the cartilage was most significant in MP group than MSC or PRP group.

Immuno-reactivity was significantly increased in the femoral and tibial cartilages of control group when compared with those of the sham group. However, these increased cells were significantly reduced by treatment of all three test materials, and the reduction was most significant in MP group.

Pro-inflammatory cytokines were increased significantly in the femoral and tibial cartilages of control group compared with sham group. However, these increases were diminished in the treated groups.



Discussion:

Osteoarthritis (OA) is characterized by the loss of articular cartilage components with inflammation, eventually resulting in impaired joint function. For this reason, this study mainly focused on the evaluation of the clinical signs, the change of ECM component and articular cartilage, the gene expression related to chondrogenesis, and the articular pathologic processes such as inflammation and apoptosis with the treatment of PRP and/or MSC. Previously, it has been reported that the intra-articular injection of PRP reduced the lameness score. Similarly, there were a meaningful decrease of lameness score with the treatment of PRP and MSC mixed with PRP in this canine OA model. Based on this result, we anticipate that PRP would relieve pain and improve articular function in an arthritic condition.

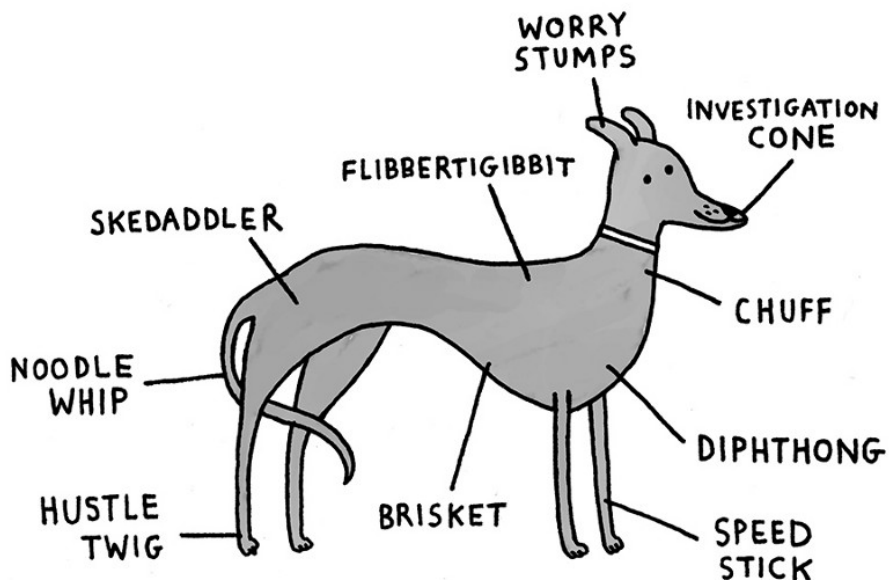
It has been known that MSC plays an important role in the cartilage repair by direct differentiation to chondrocyte and paracrine effect. In addition, it also has been reported that PRP could promote the proliferation by its various growth factors rather than differentiation of MSCs. Therefore, PRP might prevent the depletion of MSCs, enhance the effect of MSCs, and guide MSCs to properly differentiate into chondrocytes. Consistent with previous study, the results of this study suggested that each treated with either MSC or PRP could decrease death or apoptosis of chondrocytes and inhibit inflammatory response and that the co-treatment with MSC and PRP might have beneficial effects on the pathologic changes in the articular cartilage.

Conclusion:

Taken together, this study shows that the combination of MSC and PRP has a beneficial and synergistic effect on OA via the ECM synthesis and chondrocyte proliferation and via the anti-inflammatory reaction. Therefore, the combination treatment of MSC and PRP may be very useful as an inflammatory regulator for the treatment of OA that exhibit irreversible articular degeneration.

RELEVANCE TO REHAB

As I've said before, adding physio / rehab to stem cell or PRP could enhance the effects for joint health beyond one or the other alone. I'd love for someone to study that! It would seem that the stem cells in combination with the PRP could be the more beneficial factor in this study compared to the Cook et al study that used PRP alone.



Do dogs resemble their owners?

a. Roy and Christenfeld (2004) find that, yes, dogs do resemble their owners, but only if they're purebreds – that's the dogs now, not the owners. So, the old chestnut is true. Hooray!

b. Levine (2005), reanalyzing the data collected in the first study, say no – there's problems with Roy and Christenfeld's (2004) study. This means we can't yet be sure purebred dogs resemble their owners. A new study is required. Boo.

c. The authors of the original study say yes their original study was correct (Roy & Christenfeld, 2005). Hooray! (I think?)

Are dogs "ice breakers" in helping people engage in conversation?

Rogers, Hart and Boltz (1993) in an observational study of elderly dog walkers. They found dog owners have more conversations in which, surprise surprise, they often talked about their dogs.

Not only that, but dog owners tended to report higher satisfaction with their emotional, social and physical states. So not only do dogs start conversations, they may also make you healthier.



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