The "Side-By-Side" Lift/Carry Procedure

(Paradigm shift to save your back or the backs of your employees)

By
Michael Meoli, EMT-P, TP-C, NAEMT-AF
Kayli Gibbs, MS, CSCS, RYT, ACSM EP-C

Kayli Gibbs, MS, CSCS, RYT, ACSM EP-C, Exercise physiologist &
Nutritionist, San Diego Sports Medicine Firefighter Wellness program

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"After years of working as a physiologist with San Diego firefighters, I can endorse that the "Side-By-Side" lift/carry technique is the best method to reduce injury risk to rescue workers and provide comfort to patients."

Kayli Gibbs, MS, CSCS, RYT, ACSM EP-C, Exercise physiologist & Nutrisionist, San Diego Sports Medicine Firefighter Wellness program

"The 'Side-By-Side' method allows for better core stabilization and body alignment to minimize the amount of stress placed on the lower back."

Kayli Gibbs, MS, CSCS, RYT, ACSM EP-C, Exercise physiologist & Nutrisionist, San Diego Sports Medicine Firefighter Wellness program

"Since back injuries are the most common and leading cause of disability on the job, it is important for emergency personnel to adopt this technique compared to others, such as the less biomechanically-sound "Trunk-Leg" method.

The purpose of this presentation is to introduce a more efficient and biomechanically-sound manual "Lift/Carry" (L/C) procedure for EMS, Fire and Law Enforcement than the traditional one that is in common practice at the time of this writing (2019).

“Sprains and Strains” are the most common injuries reported in EMS/Fire/LE.[1]

However, the CDC breaks this category down further and finds that each year the most common injuries reported during EMS work are “trunk injuries during lifting.”[2]

Hospital and facility-based healthcare workers (RNs, CNAs, techs) are currently discouraged from manual lifting when they have access to mechanical lift equipment.

This is because it has been found that, according to the Department of Labor, healthcare workers have more than seven (7) times the national average of on-the-job injuries than the average civilian worker, and, you guessed it, *low back injuries are the primary cause*.

In fact, health care workers have more injuries than *ALL* other worker categories including the next closest classification, i.e. construction workers.[3]

The reality is that, in EMS, moving a patient quickly to the stretcher, ambulance and hospital is often a priority, time is often of the essence, many crews lack appropriate tight-space lifting adjuncts, or they fail to use the right equipment or lifting techniques.

Mechanical lifting and/or some type of transfer litter or adjunct is sometimes required when working in tight places, when you need to move bariatric patients, or there is high risk of spinal injury to the patient.

But until robots replace us, most non-ambulatory EMS patients will be lifted manually by EMTs, paramedics, firefighters and law enforcement officers.

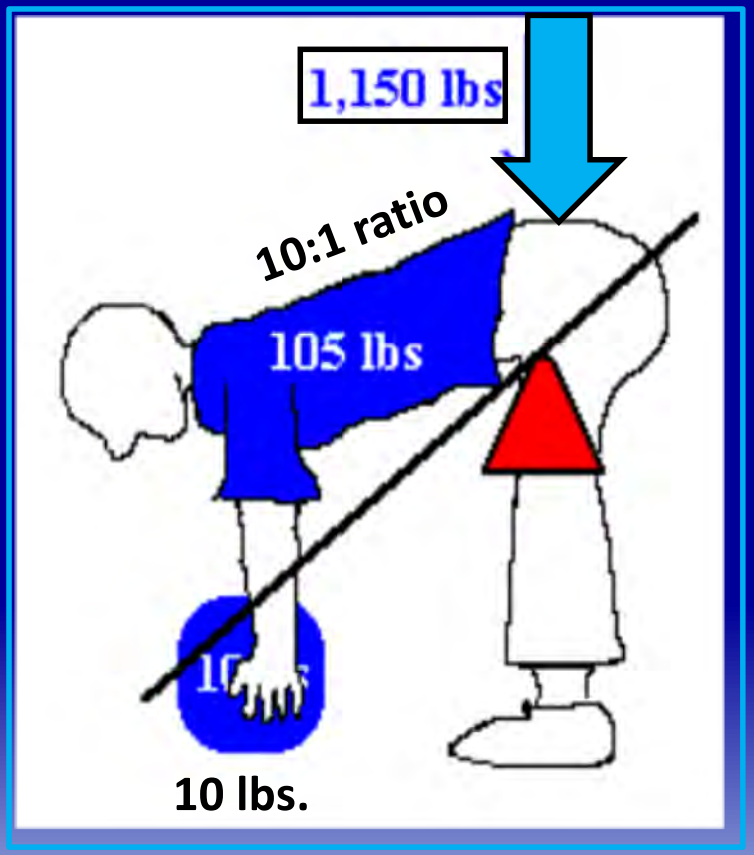
… So our goal should be to do it right and as safe as possible for all concerned.

If you are an EMS/Fire/LE first responder, you will find the "Side-By-Side" L/C is much easier on you, your partner and your patients in most situations.

If you are part of senior staff, HR, Risk Management or Health & Safety staff, we believe that - if you implement this Lift/Carry procedure effectively, there will be a marked decrease in back injuries in your agency.

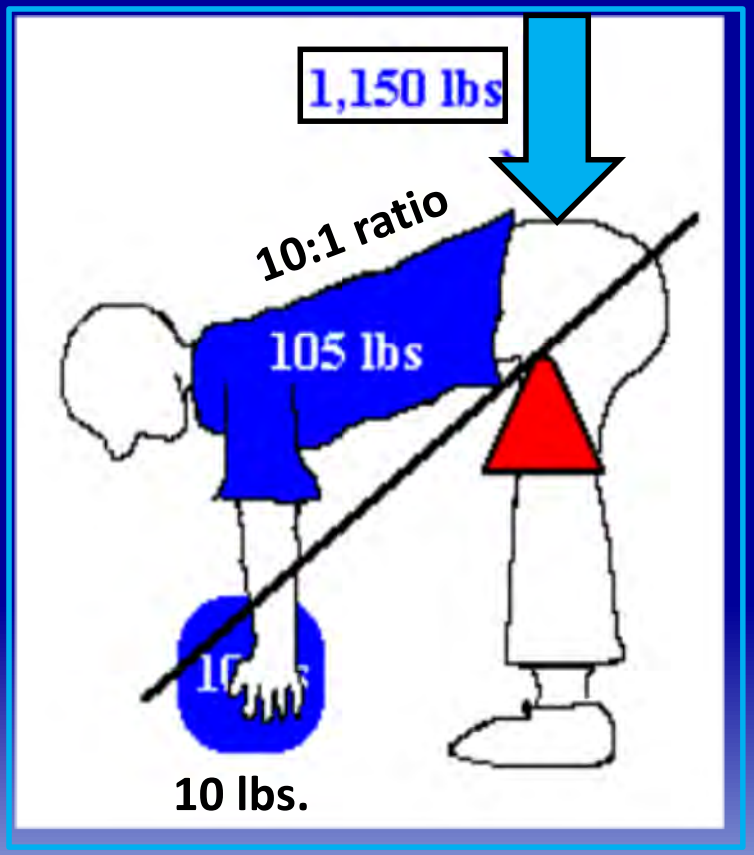
What follows is the physiology behind safe and unsafe lifting techniques:

Your waist (low back) acts like the fulcrum in a lever system **on a 10:1 ratio**.

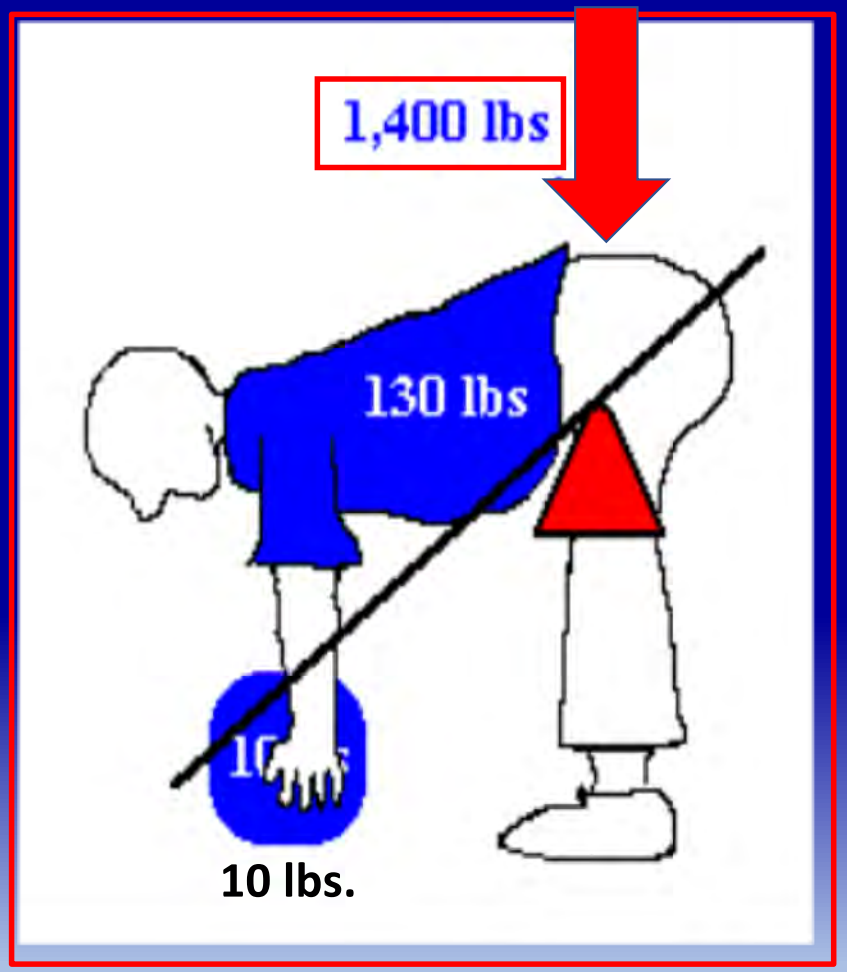


Your waist (low back) acts like the fulcrum in a lever system on a 10:1 ratio.

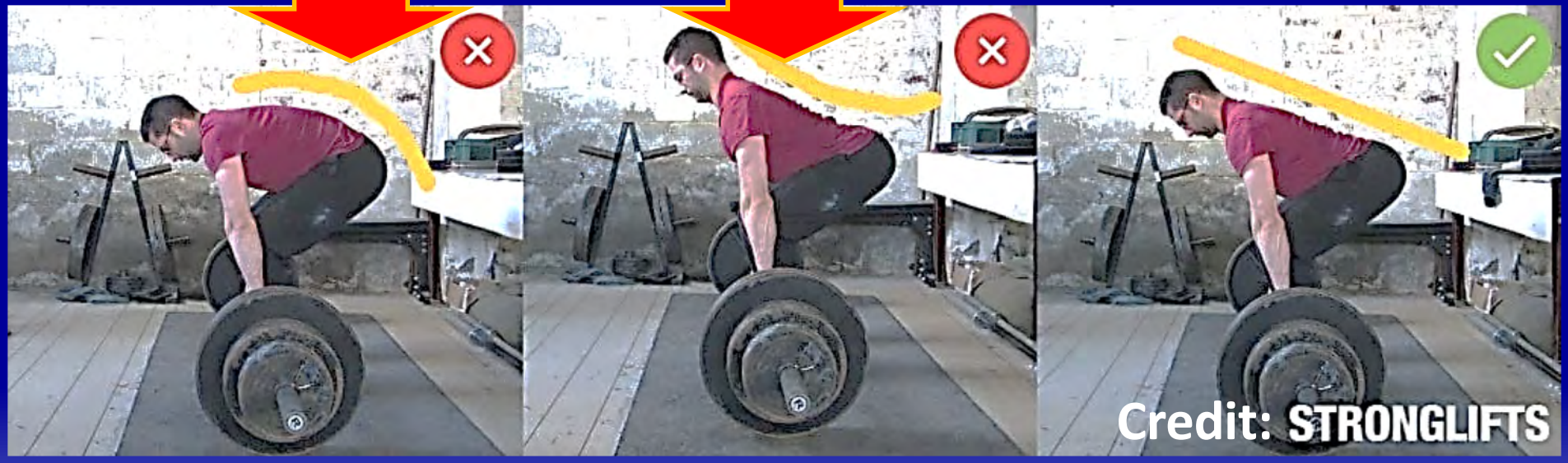
Therefore, if you add in the weight of an average 105 lb. human torso, you see that lifting a 10 lb. object actually puts 1,150 lbs. of pressure on your low back. [6]



If you are 25 lbs. overweight, **you add an additional 250 lbs. of pressure on your back** every time you bend over. [6]

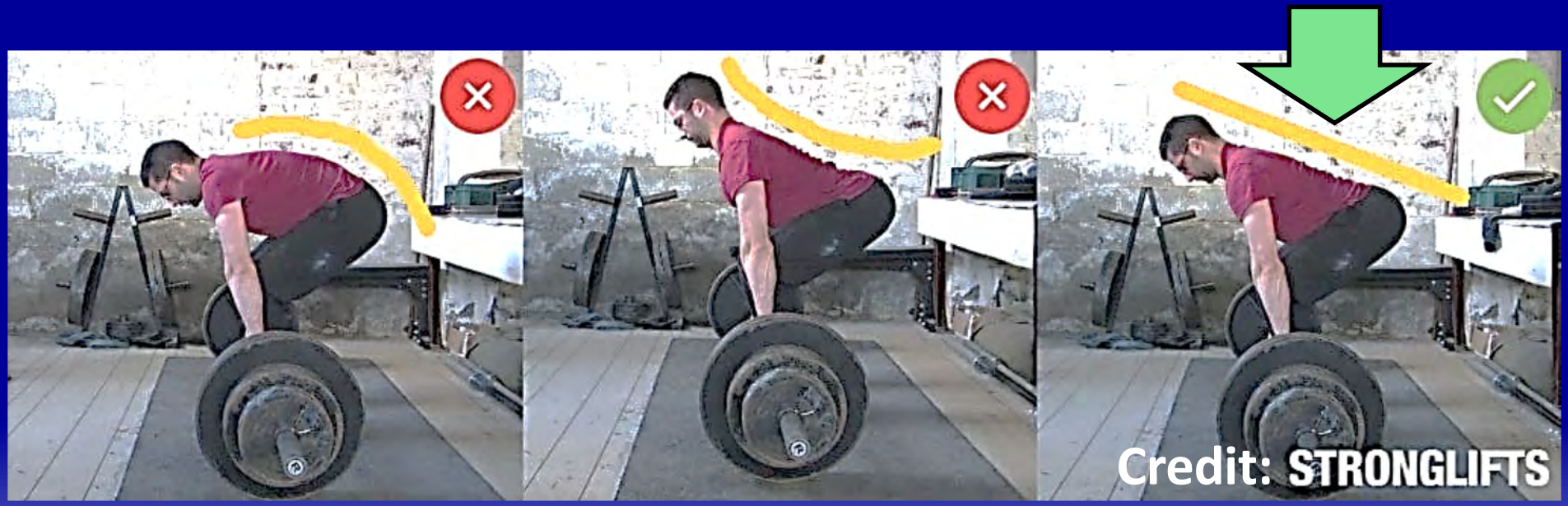


Whether you are lifting a patient manually, or lifting a litter the patient is on, you are doing a version of a **"Deadlift."** All lifting can injure your joints if you use bad form.

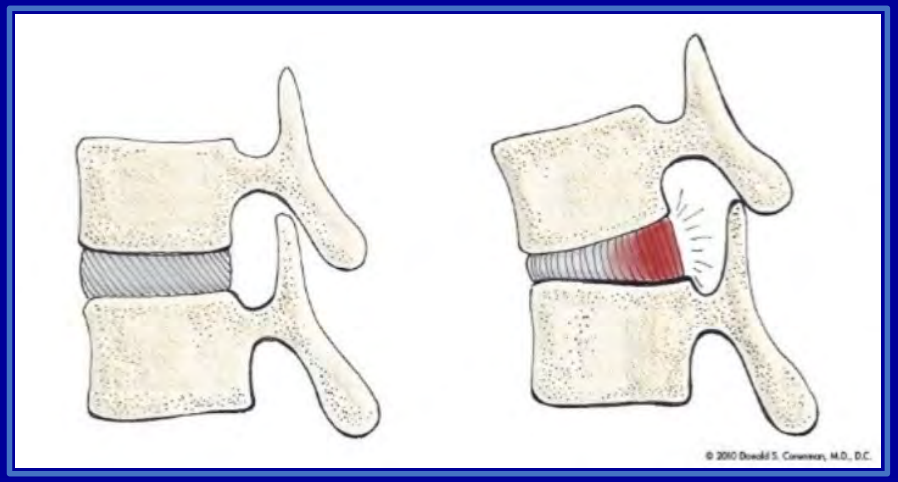


The most dangerous mistake you can make when deadlifting is to lift with a bent lower back. It puts uneven pressure on your spinal discs and can cause bulged or ruptured discs, pinched nerves and other back injuries.[7]

The safest way to perform a Deadlift is with your spine neutral (back flat).[7]



These illustrations demonstrate the stresses on the back wall of the disc when standing relaxed (neutral) - and with flexion (bending forward)



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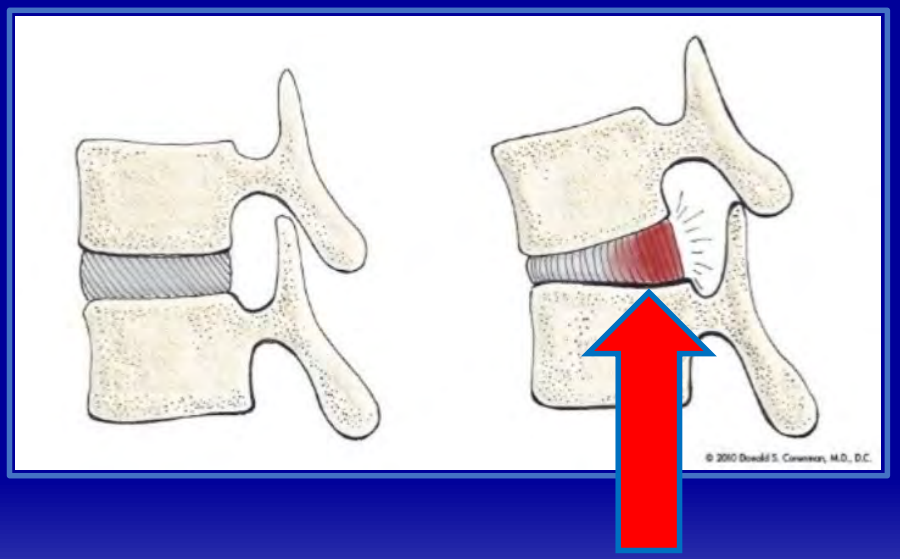

- **With forward bending, the back wall of the disc is stretched.**

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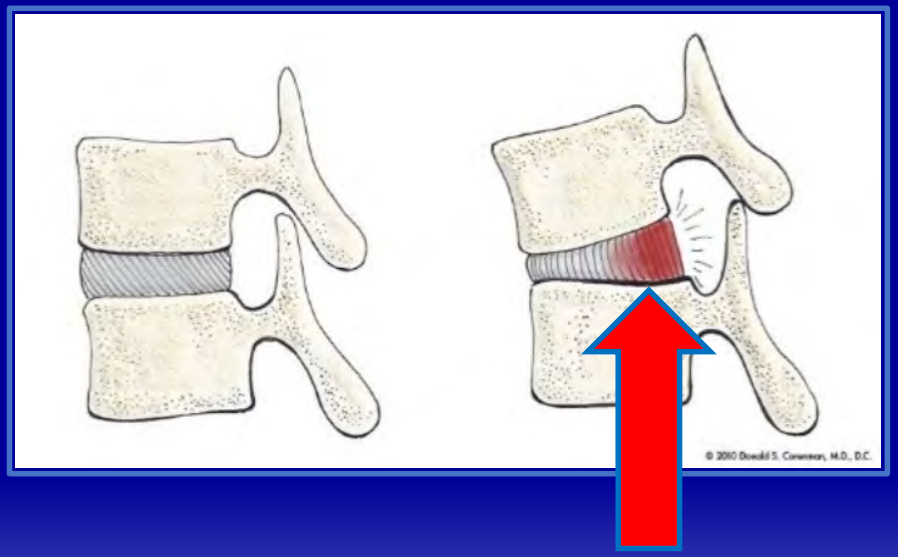
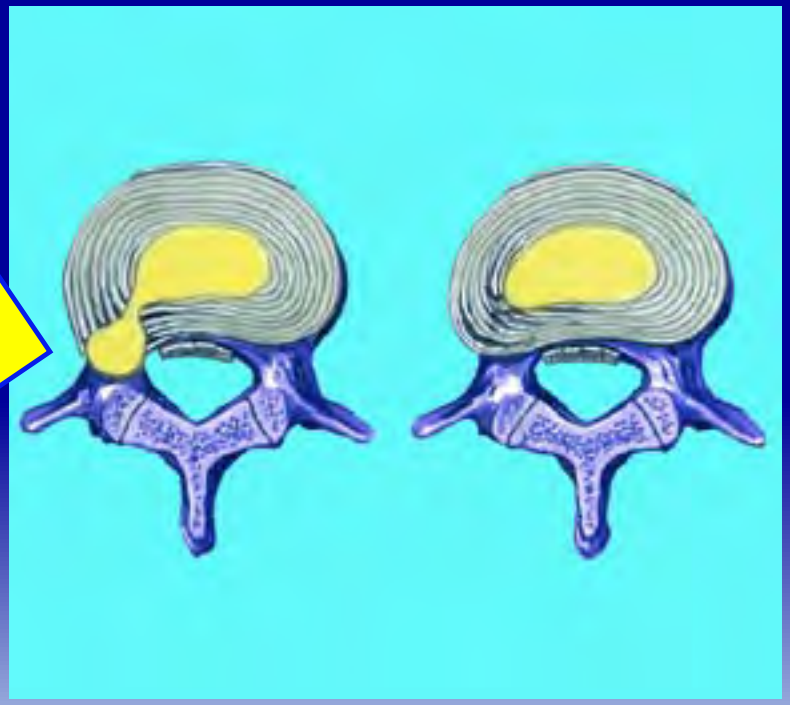


- **With forward bending, the back wall of the disc is stretched.**
- **With any significant load (lifting), the fibers are tensioned and can tear.[8]**

Twisting **at the waist while lifting, carrying or lowering a load is another common cause of back injury.[6]**

Twisting at the waist while lifting, carrying or lowering a load is another common cause of back injury.[6]

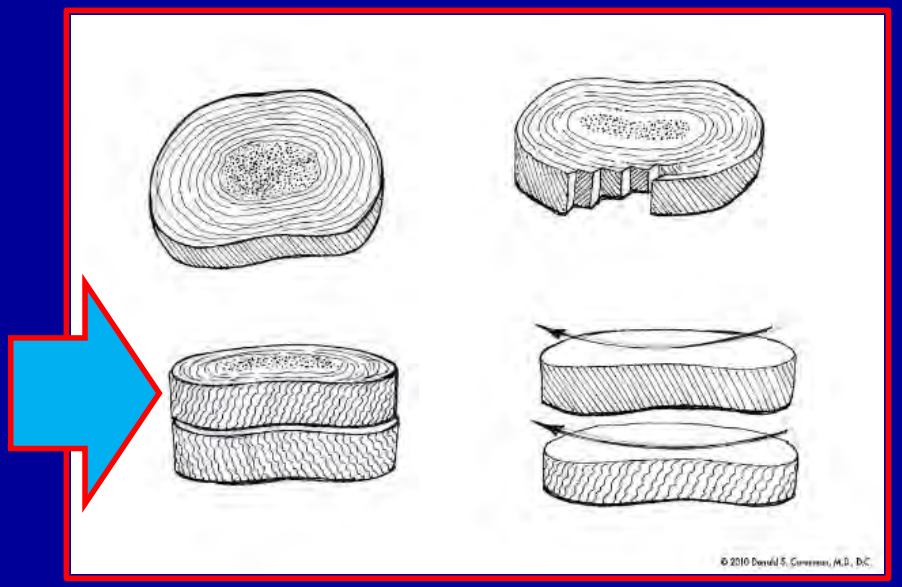
It destroys spinal alignment, puts uneven lateral pressure on your discs, and is about the most dangerous posture you can do while lifting a load.

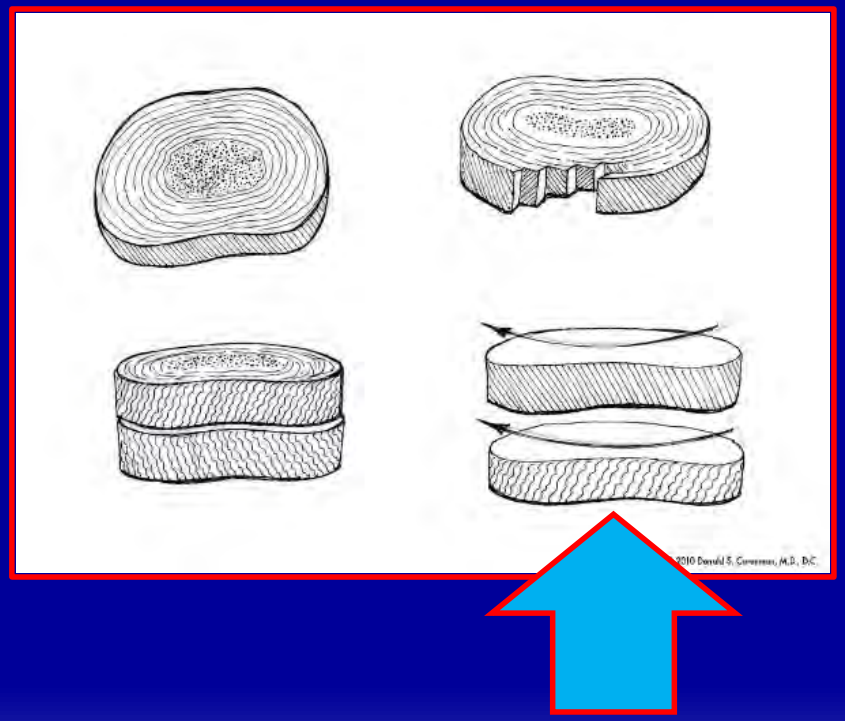


Spinal discs are made up of about
30 rings of collagen - just like plies of a tire.

You can see that the orientation of the fibers alternates with each layer.

This makes for a strong and redundant disc wall when the spine is in neutral - but with *twisting* (rotation), half of the fibers undergo tension and the other half become relaxed.





Rotation of the spine therefore weakens the disc wall and it becomes more susceptible to tearing.

The moral of the story?

Don't *twist* when you lift![8]

Respected orthopedic surgeon, Donald S. Corenman, MD, coined an acronym appropriate for emergency personnel to always consider before lifting a patient: [8]

"NO BLT, NO BLT, NO BLT!"

(No Bending, Lifting & Twisting at the same time)

According to Dr. Corenman,

"This one position
(bending, lifting and twisting – BLT)
is responsible for most injuries
to the lower back. [8]*"*

Before we introduce a better manual L/C for EMS (and other) calls, it is important that we review best practice general lifting concepts.

Accepted Universal Safe Lifting & Lowering Standards:[4,5]

1. **Stand close to the person or object, with your feet shoulder-width apart and your toes pointed naturally outward;**

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3. Pull the load close to you and grasp it firmly;
4. Tighten your stomach muscles; they will then act as a back support.

Accepted Universal Safe Lifting & Lowering Standards:[4,5]

5. **Use your strong leg muscles, *not your back muscles*, to power the lift or lowering. While lifting or lowering, keep your back straight. Raising your chin while lifting will help your back maintain its natural curvature; and**

Accepted Universal Safe Lifting & Lowering Standards:[4,5]

5. **Use your strong leg muscles, *not your back muscles*, to power the lift or lowering. While lifting or lowering, keep your back straight. Raising your chin while lifting will help your back maintain its natural curvature; and**
6. ***Avoid twisting*, especially when bending forward while lifting or lowering a load. Turn by moving the feet rather than twisting the torso.**

We will now carefully examine common EMS lifting scenarios and compare two alternative manual Lift/Carries (L/Cs):

- **One is the traditional one in common use throughout the U.S. and Canada (in 2019),**
- **The other is our recommended Lift and Carry (L/C) that can be used, when feasible, that provides best lifting techniques - *with no BLT!***

This is the common version of the traditional “Trunk-Leg” L/C:

At the time of this writing, the Lift/Carry (L/C) pictured to the right is still the most common one in practice for U.S. and Canada EMS/Fire/LE personnel on medical calls.

This is the common version of the traditional “Trunk-Leg” L/C:

It is called by several names including “Trunk-Leg,” “Fore & Aft,” and “GS” (Georgia Street).

This is the common version of the traditional "Trunk-Leg" L/C:

Most places don't have a name for it because it is the ONLY 2-person L/C they know. And, yet it takes more time, is less comfortable for the patient and MUCH more awkward and injurious to the rescuers than the alternative …

This is the most secure version of the "Side-By-Side" Lift and Carry (L/C):

It has many biomechanical advantages over the traditional Trunk-Leg L/C for both first responders and patients.

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Among these advantages are:

Most secure version of the "Side-By-Side" Lift and Carry (L/C):

1. The <u>weight is shared equally</u> by both partners;

This is the most secure version of the "Side-By-Side" Lift and Carry (L/C):

2. It can be accomplished without flexing of the low back - thereby maintaining maximum core stabilization;

This is the most secure version of the "Side-By-Side" Lift and Carry (L/C):

3. It can be accomplished without any twisting of the lower back, thereby maintaining spinal alignment;

This is the most secure version of the "Side-By-Side" Lift and Carry (L/C):

4. In multi-casualty and high risk situations, you can move victims more than twice as fast, with less injuries than with the traditional "Trunk-Leg;"

The **“Side-By-Side”** L/C was originally developed for tactical situations because you can move a victim off target more than twice as fast as the Trunk-Leg L/C.

When you get to a rescue vehicle, the **“Side-By-Side”** L/C is much easier to load victims quickly and with less injury to the victim or rescuers.

The only time a version of the traditional Trunk-Leg Lift/Carry is used in tactical situations is when moving patients through narrow doorways or narrow passageways - or when there is no room for other L/Cs.

Special note for using the Side-By-Side for rapid extraction in tactical situations:

Before rapidly moving off target, be sure you accomplish the lift with no BLT

Special note for using the Side-By-Side for rapid extraction in tactical situations:

When carrying off target be sure you are upright and NOT bending forward because you will be twisting at the waist to move rapidly.

- **The relatively infrequent tactical situations that are seen pale in comparison to the thousands of EMS calls each day where first responders could reduce or eliminate back and other injuries if they adopted and utilized the “Side-By-Side” L/C method.**

Scenario-Based Head-to-Head Comparisons
Traditional "Trunk-Leg" L/C vs. the "Side-By-Side" L/C

"Trunk-Leg" L/C vs. "Side-By-Side" L/C

Let's start with the most frequent reason we lift patients.

Comparison Scenario #1: Placing a patient on the gurney

"Trunk-Leg" L/C **vs.** **"Side-By-Side" L/C**

Traditional “Trunk-Leg” L/C

Both partners have to bend over, causing maximum back flexion to occur and also twisting at the waist, thereby creating hundreds of pounds of uneven pressure on the low back.

Traditional “Trunk-Leg” L/C

Both partners have to bend over, causing maximum back flexion to occur and also twisting at the waist, thereby creating hundreds of pounds of uneven pressure on the low back.

The trunk partner bears double (2X) the weight of the legs partner - and therefore twice (2X) the weighted shearing on the lower back.

“Side-by-Side” L/C

- Both partners share the weight equally.
- Simply squat with legs, keeping back straight, and gently lower or lift patient to or from the gurney.
- NO twisting at the waist.
- Much more core stabilization and spinal alignment than the traditional “Trunk-Leg” L/C

“Side-by-Side” L/C

- Both partners share the weight equally.
- Simply squat with legs, keeping back straight, and gently lower or lift patient to or from the gurney.
- NO twisting at the waist.
- Much more core stabilization and spinal alignment than the traditional “Trunk-Leg” L/C

- More comfortable and secure for the patient.
- Some people, especially women, do not like a stranger grabbing around their chest from behind - as required by the Trunk-Leg L/C

Comparison Scenario #2:

Placing a patient into (or out of) a wheelchair (or any chair)

"Trunk-Leg" L/C vs. "Side-By-Side" L/C

Comparison Scenario #2:

Placing a patient into or out of a wheelchair (or any chair)

Traditional "Trunk-Leg" Lift and Carry (L/C)

- Maximum spinal flexion putting more weight on the low back than legs.
- Trunk partner bears twice the weight.

- The back of the wheelchair is an obstacle for trunk partner who has most of the weight.

Scenario #2:

Placing a patient into or out of a wheelchair (or any chair)

"Side-by-Side" Lift/Carry (L/C)

- No spinal flexion - making it easier to use legs rather than back in lifting/lowering
- Both partners share the weight equally.

Scenario #2:

Placing a patient into or out of a wheelchair (or any chair)

"Side-by-Side" Lift/Carry (L/C)

- No spinal flexion - making it easier to use legs rather than back in lifting/lowering
- Both partners share the weight equally.

- Easier to lift or lower - with no obstacles.

Comparison Scenario #3:
Lifting a person on or off a sofa or bed

Traditional "Trunk/Leg" Lift & Carry (L/C)

- Using the "traditional" Trunk-Leg L/C to lift a person on or off a soft sofa or bed is particularly difficult results in maximum spinal flexion for the partner at the patient's legs.

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- Trunk partner has to *twist at the waist* during the awkward maneuver of dropping a foot to the ground just as he/she takes up most of the weight.

Comparison Scenario #3:

Lifting a person on or off a sofa or bed

"Side-by-Side" Lift/Carry (L/C)

#1

- Talk to the patient, Place your forearms, palms up, under the patient's armpit on each respective side;

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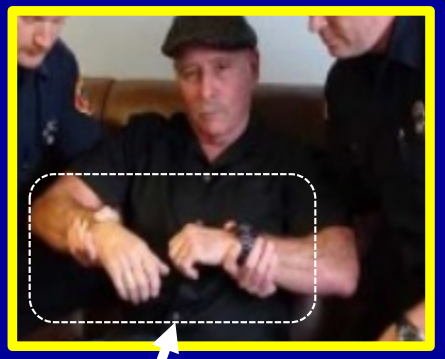

#1

#2

- Talk to the patient, Place your forearms, palms up, **under the patient's armpit** on each respective side;

- **Lock the patient's wrists** – using an underhand lock for most. (Overhand lock when necessary)

“Side-by-Side” Lift/Carry (L/C)

#3

- Square off facing your partner and place your other hand under the patient’s knee.

“Side-by-Side” Lift/Carry (L/C)

#3

- Square off facing your partner and place your other hand under the patient’s knee.

#4

- Communicate with your partner and come to a standing position using your legs - not your back.

Comparison Scenario #4:

When the patient is unconscious - with flaccid muscle tone

Traditional "Trunk/Leg" Lift & Carry (L/C)

- Using the traditional Trunk-Leg L/C, if the patient goes "*rag arms*" - the "trunk" partner often has a difficult time preventing the patient from slipping to the deck.

Comparison Scenario #4:

When the patient is unconscious - with flaccid muscle tone

Traditional "Trunk/Leg" Lift & Carry (L/C)

- Using the traditional Trunk-Leg L/C, if the patient goes "rag arms" - the "trunk" partner often has a difficult time preventing the patient from slipping to the deck.
- Even if the "trunk" person can complete the L/C, the patient will be "*chicken wings*," potentially injuring their elbows or shoulders - as well as the lower back of both partners.

Comparison Scenario #4:

When the patient is unconscious - with flaccid muscle tone

The "Side-by-Side" Lift & Carry (L/C)

- With the Side-by-Side L/C method, if the patient goes "rag arms," all the partners need do is hold the patient's wrists, "plant" the patient's elbows in their chests and lean into each other.

Comparison Scenario #4:

When the patient is unconscious - with flaccid muscle tone

The "Side-by-Side" Lift & Carry (L/C)

- With the Side-by-Side L/C method, if the patient goes "rag arms," all the partners need do is hold the patient's wrists, "plant" the patient's elbows in their chests and lean into each other.
- This way the patient remains secure and the partners are able to keep their backs straight and properly aligned.

Alternate Versions of the “Side-by-Side” Lift & Carry (L/C)

#1

Inter-locking arms under the patient’s legs

- If the partners **inter-lock their arms under the patient’s knees,** it may be slightly more comfortable for the patient;

Alternate Versions of the “Side-by-Side” Lift & Carry (L/C)

#1

Inter-locking arms under the patient’s legs

- **Note, however, that if you start out in this position from the floor, chair, or bed, it requires more back flexion.**
- **In addition, the partners are slightly off center, putting more pressure on one side of their low back than the other.**

Conscious patient allowed to put their arms over the crews' shoulders

#2a

#2b

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- Allowing the patient to put their arms over your shoulders often gives them a better feeling of control.

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#2a

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- Allowing the patient to put their arms over your shoulders often gives them a better feeling of control.
- However, you and your partner will have less control if they shift around and, of course, this will only work with patients who are conscious, alert and cooperative.

CONCLUSION: **This version of the Side-By-Side Lift & Carry (L/C) provides the BEST CONTROL and allows the best lifting techniques from start to finish.**

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Note to EMS/Fire/LE Senior Staff, HR and Training Officers:

The Side-By-Side L/C can be effectively taught to members of your agency in less than 30 minutes. The authors believe that if you implement this training and recommend it's use on EMS (and other) calls, you will save your members some low-back misery and reduce Worker Comp claims, Industrial Leave and Disability.

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However, at this point it is simply a deductive theory, yet to be proven in scientific studies. Most agencies capture quarterly data on employee injuries and put them into categories, such as "Low-back injuries." If yours does you may be able to help prove the efficacy of this lifting technique.

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If you decide to make such a commitment, need help with Train-the-Trainer or actually do see a measurable decrease in back injuries in the quarters after you implement, feel free to contact the authors – their contact information follows page.

About the Authors

Michael Meoli, EMT-P, TP-C, NAEMT-AF is the CEO of Tactical Rescue Options, LLC which provides instruction, consultation and direct support in and out of the U.S. In 2018 he retired as a Firefighter/Paramedic with San Diego Fire & Rescue and a Certified Tactical Paramedic (TP-C) for SDPD SWAT and other government teams. In 2013 Mr. Meoli retired as a US Navy SEAL Operator Chief/Advanced Tactical Practitioner (ATP). In addition to numerous other credentials and relevant to this article, he served as a civilian ACE/ACSM Personal Trainer and Navy SEAL Command Fitness Leader (CFL). He can be contacted at frogmed79@gmail.com (619) 980-7362

Kayli Gibbs, MS, CSCS, RYT, ACSM EP-C, is an exercise physiologist with the San Diego Sports Medicine Firefighter Wellness program. She is also a certified strength and conditioning coach and yoga instructor for San Diego firefighters and other populations. She earned her Masters of Science degree at San Diego State University in Exercise Physiology and Nutritional Sciences. She can be contacted at kayli@sdsm.com (619) 814-5400 ext. 172

References:

1. Houser, Ari N. (et al.), NIOSH "Emergency Responders Injuries and Fatalities," analysis of surveillance data by Rand Corp., March 2004
2. CDC/NIOSH Injury and Illness data for EMS Workers 2014 https://www.cdc.gov/niosh/topics/ems/data.html
3. Howard, NL, "Safe Patient Handling," American Nurse Today, Vol. 5, Num. 7, July 2010
4. OSHA Ergonomics Principles Index https://www.osha.gov/SLTC/etools/electricalcontractors/supplemental/principles.html#lifting
5. BLR "5 Keys to Safe Lifting," November 2011 https://safety.blr.com/workplace-safety-news/safety-administration/safety-general/11zll02-Five-Key-Steps-for-Safe-Lifting-
6. Fort Lee VA Safety Office, "Back Safety and Lifting" PPt. August 2015 www.lee.army.mil/safety/documents/Backsafety.ppt
7. Mehdi, StrongLifts, "Deadlifting Technique," December 2017 https://stronglifts.com/deadlift/#Deadlift_Technique
8. Corenman, D, MD, DC, Steadman Clinic, "Lifting Techniques," 2017 https://neckandback.com/pre-and-post-op/lifting-techniques/#single/0

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