

Raising the Roof...

When it comes to patient removal from crashed vehicles there are many options that need to be measured as far as the path of egress is concerned, issues such as access to the pt, degree or level of entrapment, compartment intrusion etc, are all considerations that are part of the decision making process. You have to ask yourself what is going to be the safest, most effective and the least time consuming path of patient egress according to the patient's condition.

So, depending on those decisions, one other consideration needs to be made; is this a rapid extrication with a life over limb mindset or do we have a little more time to spend on patient removal? We also need to be clear on what rapid extrication really means.

Definition: rapid extrication is the removal of a patient(s) from a hazardous environment or life-threatening situation, as quickly and safely as possible while using the greatest amount of packaging & stabilization as the situation will allow.

From an emergency medical perspective, positioning a patient on to a backboard in a straight line with minimal twisting and manipulation will minimize or reduce spinal compromises that cannot be ruled out or diagnosed on scene. *By using the acronym N.B.T. Nose, Bellybutton, Toes, we will keep these body parts in line with each other and offer the pt the best level of care possible.*

From a rescuer perspective, removing the roof will generally provide the largest amount of workspace for rescuers and tools inside the vehicle while offering the maximum amount of removal space for occupants. But if time is working against the critical patient, perhaps leaving the roof intact and just merely creating pt removal space can sometimes be seen as the answer. The "rear window tent" is a technique for rapid extrication pt egress path; or if the roof is built with ultra high strength steel and your current hydraulic cutters are not up to the task.

Give this a try;

Break and remove the roof's rear window glass, insert a hydraulic spreader in the center of the rear window opening, one tip of the spreader must be in contact with the edge of the roof in the center, the other tip can spread down on the rear trunk deck or the top of the rear seat.



Expand spreader arms to full extension, this will collapse the truck deck and create a “tenting” effect in the center of the roof producing a large enough hole for a rescuer to enter and a patient to be safely removed.





Next the seat(s) will need to be reclined, if you find it too tight to get a hand on to the recline lever, the thin hook end of a pike pole can be inserted from behind to grab on to and release the lever. Also for a little extra room the head rests can most often be removed. For vehicles that have a detachable cardboard type trunk deck, a 4 ft 4x4 can be substituted for support to span across the trunk area, this will allow the spreader tips to have enough support to spread the roof upward. Another option if the pt is quite large would be to cut one side of the rear roof pillar, this will reduce the tension on one side and permit the roof to spread open much further than the first option. This cut however will add more time to your platinum 10 minute time frame. Make certain that prior to any spreading or cutting into any roof structure that the plastic trim is striped including head liners and underneath rear trunk deck bulk heads as some manufacturers will install roof curtain cylinders in these unsuspecting locations. If the final decision is made to remove the roof, just remember, as always, that the crew and patient safety are paramount.

One other issue that has not had much attention paid to it is the actual cutting of laminated windshield glass.

Most rescuers haven't put much thought into the actual hazards of cutting laminated glass, myself included. What prompted my curiosity stemmed back a couple of years ago when I was judging an Extrication challenge on the Coast of British Columbia, the challenge was running a bit late which put us into just before dusk on a sunny day. The team competing was half way into their scenario when the

call was made to completely remove the roof of the vehicle for a straight up and out pt egress. All pillars of the roof were cut from back to front, and then one continuous cut from A- pillar to A-pillar including the laminated windshield glass. The roof was then relocated to the designated debris pile about 20 feet away; the process took a respectable time of about 5 minutes. Now at all T.e.r.c. sanctioned extrication challenges, it is absolutely mandatory that all rescuers including the live patient wear an N95 Dust mask while removing glass. These personal protective barriers were in place at the time for the competing team. I just happen to step back from the action circle by about 30 feet and was facing into the sun and there was not a stitch of wind that day, What I saw was a real eye opener for me, everywhere I looked for at least a 50 square foot radius was fine particle glass dust that would not dissipate quickly. I moved around the whole working pit area and every time I looked into the sun I could see the fine dust, it even extended into the crowd and no one was aware of it because they were not facing into the sun. At that time I ordered all spectators to move back until the dust finally settled and the competing crews to keep their masks on until it was safe. I knew glass dust could linger but I didn't realize to what extent. When I got back home I started doing some research on glass dust, the associated hazards and this is what I found.

In discussions with many glass replacement and windshield glass manufactures I was informed that today's laminated glass is made up of 70 % Silica and other raw Materials.

Modern laminated windshield glass is made up of these Ingredients; Poly Vinyl Butyral, Iron oxide, Silica sand, Soda ash, Dolomite and Limestone.

Listed below is the MSDS on Silica, the main ingredient:

OSHA REGULATORY STATUS

This material is considered hazardous under the OSHA Hazard Communications Standard (29 CFR 1910.1200).

POTENTIAL HEALTH EFFECTS:

Inhalation:

- a. Silicosis Respirable crystalline silica (quartz) can cause silicosis, a fibrosis (scarring) of the lungs. Silicosis may be progressive; it may lead to disability and death.
- b. Lung Cancer Crystalline silica (quartz) inhaled from occupational sources is classified as carcinogenic to humans.
- c. Tuberculosis Silicosis increases the risk of tuberculosis.
- d. Autoimmune and Chronic Kidney Diseases Some studies show excess numbers of cases of scleroderma, connective tissue disorders, lupus, rheumatoid arthritis, chronic kidney diseases and end-stage kidney disease in workers exposed to respirable crystalline silica.
- e. Non-Malignant Respiratory Diseases (other than silicosis) Some studies show an increased incidence in chronic bronchitis and emphysema in workers exposed to respirable crystalline silica.

Eye Contact: Crystalline silica (quartz) may cause abrasion of the cornea.

Chronic Effects: The adverse health effects -- silicosis, lung cancer, autoimmune and chronic kidney diseases, tuberculosis,

Signs and Symptoms of Exposure: Generally, there are no signs or symptoms of exposure to crystalline silica (quartz).

Inhalation: No specific first-aid is necessary since the adverse health effects associated with exposure to crystalline silica

(quartz) result from chronic exposures. If there is a gross inhalation of crystalline silica (quartz), remove the person

immediately to fresh air, give artificial respiration as needed, seek medical attention as needed.

Eye Contact: Wash immediately with water. If irritation persists, seek medical attention.

Precautions During Handling and Use: Do not breathe dust. Use adequate ventilation and dust collection. Keep airborne

dust concentrations below permissible exposure limit ("PEL"). Do not rely on your sight to determine if dust is in the air.

Respirable crystalline silica dust may be in the air without a visible dust cloud.

This may sound extreme or a little over the top but I would rather not subject ourselves to any more preventable health hazards than we have to. Especially to those rescuers / instructors that train a lot and cut laminated glass on a regular basis.

Reading the above information will hopefully prompt rescuers to be a little more diligent and wear a N95 style dust mask when working around glass dust and particles. But does everyone involved at the scene usually wear a mask when windshield cutting is taking place? My experiences have shown otherwise, I have yet to see most personnel working at an extrication scene put on a dust mask while glass-cutting evolutions are proceeding.

What about our patients? They must be completely covered to protect him or her so that no glass particles or dust come in contact with their lungs and open wounds as well. What about using our Balaclavas or Nomex hoods? Is that not good enough? Here is a simple test, hold your Balaclava up to the light; can you see daylight through it? If you can, it may be able to stop large glass particles but it will do nothing for glass dust.

Well, do we always have to cut the windshield to remove a roof?

Not always, let's consider some alternatives.

Here are a few methods that we can look at that will eliminate cutting the laminated glass thus reducing the hazard.

Start by stripping the interior trim on the inside of all the roof pillars to check for and avoid cutting into any un-deployed roof curtain cylinders or seat belt pretensioners and reinforced seat belt mounting brackets . If the side window safety glass is still intact manage it accordingly, roll down into the door if possible or break it in a safe and controlled manner. Cut the rear pillars first then move onto the B-pillars and finally the A-pillars. Also, don't forget to cut the seatbelts that may still be attached to the pillars.

It is important to use a reciprocating saw to make these last two A-pillar cuts; the thin blade will allow a low, clean cut. Ensure the cut is made as close to the dash as possible. Consequently the blade should ride just on top of the dash but not enough to cut into it. Cut all the way through the pillar but do not cut into the windshield

except for about a 1¼ inch. These cuts need to be in line with the bottom of the windshield where it is glued in to the frame.



With a minimum of two rescuers preferably 4, start to lift the rear of the roof upward until it is in a position close to 90 degrees.





At this point the rescuers will need to take most of the weight of the roof for a brief moment until it is past the 90 degree break-over point, and then continue to flip the roof over towards the hood.





If all goes as planned, the bottom of the windshield will dislodge from the Black polyurethane glue or mastic where it attaches at the top of the dash. You can relocate the roof and windshield out of the action circle as one.

Glass fragments should be extremely minimal, if you suspect there may be a small amount of fragments, a disposable blanket can be stuffed in between the windshield and the dash to catch any stray fragments prior to lifting up the roof.

Another option is to follow the same procedure as before but instead of cutting low on the A-pillar, the cutting will be made high. Make two relief cuts at the top of the A-pillars roughly 2 inches back from the top of the windshield, about 6- 8 inches long with either a hydraulic cutter or reciprocating saw. Be sure to avoid the strengthened areas where the sun visor bolts to the roof on the inside and check under the headliner for roof curtain cylinders as some manufactures such as Ford hide them near this location. Now fold the roof forward and secure it to the front of the vehicle. This procedure works well if the A-pillars are constructed of ultra high strength steel and/or the windshield /A-pillars will not hinder other procedures or reduce working space.

Vehicle on its roof with crush intrusion into the passenger area.

Stabilize the vehicle, taking care to support the weight with strut systems and remove the weight bearing down on the roof pillars to avoid further roof crush damage and injuries to patients. If there is severe roof crush, the vehicle may have to be lifted and the roof displaced or detached to assist with pt removal. If displacing the roof start by cutting the C, B and A-pillars, in that order.



When it is time to cut the A-pillars make the cut with hydraulic cutters at the top corners of the windshield as indicated.



There should be roughly a 1 inch void from the thickness of the cutter blades that will be enough room to insert the tips of a hydraulic spreader.



When the spreader tips are expanded inside the cut, it will break away the roof and leave the complete windshield attached to the vehicle.



The vehicle will be left supported by the struts and the roof can be slid out from underneath the vehicle for access to the patients.

There are always a few Negatives for every procedure:

- **There is no question that a high wind will cause problems for flapping a roof over, but the odd occasion that it is strong enough to cause a**

problem will be far outweighed by the number of times you'll create airborne glass dust and shards using the standard methods.

- **Some A-pillars will be difficult to cut low enough to meet the bottom of the windshield; A few popular mini vans will have this issue, judge your procedures accordingly.**
- **A few late model high end vehicles are starting to use laminated glass in the side windows, the reason is to help keep passengers inside the vehicle to avoid being ejected in a rollover and to help keep the bad guys out for a security measure against theft. A small sticker in the corner that states “security glass” can identify this type of glass. If at all possible roll these windows down to avoid having to cut them.**

When you are left with no alternative but to cut the laminated glass, at the very least you can place duct tape across the windshield and cut through it to minimize the glass dust on the outside of the vehicle.

Summary,

Before beginning any plan, the dilemma at hand must be clearly recognized in order to develop useful options. Once practicable options are identified, the vehicle and available tools are evaluated to find a good fit between tasks, equipment, and vehicle. By taking advantage of the available options, the roof can be eliminated as a cause of entrapment or impediment to the function or effectiveness of other procedures.

Keep your head up!

~Randy Schmitz