Techniques in Big River Caves

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ABSTRACT

During the year and a half of preparation for the Untnmed Ri Expedition (Caves $ Caving 29 p. 29) a lot of time was devoted developing the techniques we would use to explore the roaring wh waters of Nare. We finally left for New Britain with a whole new set caving rules and hardware which would not be out of place in an Indi Jones movie.

The first serious work to tackle this new problem in caving wa pioneered by the French in 1978 after the discovery of the Nare, M and Kavakuna - all big river caves with flows of 15~20 cumes. We tir out these techniques on the white water rivers of north Wales, ma some improvements and tested some new ideas.

This articles is a summary of our research and experience.

I. Equipment

For Nare we took all the normal caving and climbing hardware we could lay our hands on and a few wet cave essentials - Crewsaver Marine Slimfit bouyancy aids and R.D.F. inflatbles. Our heavy artillery came in the shape of a compressed air grappling iron launcher which was capable of firing a grapnel 200m. We took 9 and 10 mm Beal SRT and 10mm hawser laid polyprop for lifelining and handlines.

II. The First Croosing

This is the real crux move of big river negotiation, requiring a lot of composure, good team work and, dare I say it, a certain amount of luck. Progression in the river is seldom possible and one must keep out of the

water as much as possible. The passage can usually be traversed on one side or the other and the problems arise when the river has to be crossed, often at a bend where banking gives way to an undercut, smooth wall.

III. The Trail Ferry

In some caves it is possible to swim or ford the river while infelined but in the Nare the current was too strong. We found the Trail Ferry method by far the most favourable and used it wherever conditions allowed.

Selecting the crossing site is important. Ideally there should be a suitable lifelining stance downstream and the least turbulent water one can find. The ability to "read" the water is a great help (canoeists would fare well) as the pitfalls can be seen in advance and prepared for, or avoided altogether.

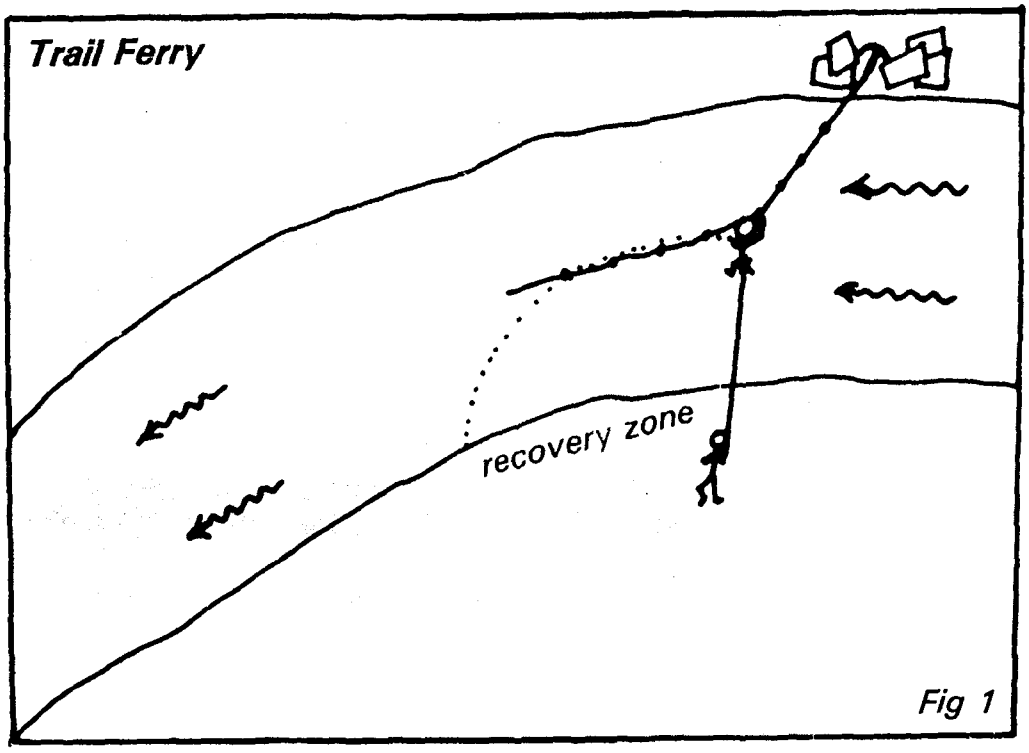


Fig 1

Using a grapping iron, chock or large knot a fixed line is established on the opposite bank. A few overhand knots in the rope aids gripping whilst in the current. The best position for take - off is a few metres downstream from opposite the attachment, giving a smaller arc(Fig 1). By either wading out to the fast water or by leaping part way across it, the first crosser is swept to the other side in seconds. If he losses the fixed rope or it becomes detached he is brought in by the lifeliner.

IV. Using a dinghy

A similar method can be used with a dinghy with the advantage that more violent currents can be passed. The best way is to lie on your belly in the dinghy and fight your way across. The French recommend the use of flippers as well. The crosser must not be attached to the dlinghy ; the fixed rope can be attached to the boat or held by the explorer (who should be lifelined as normal). Another rope from the dinghy should be considered to retrieve the raft in case of mishap. Care is needed to avoid entanglement of the ropes.

1. Left on each tyrolean

One to the main belay and two on the system itself. For a tyrolean say 2m above the water, hand tightness will suffice. Those nearer water level will need to be tighter and an additional 2 - 1 pulley system can easily be attached with a jammer to gain extra tension. After each of the first few crossing the tyrolean will have to be further tensioned to take up the stretch in the rope and knots. This is done by slackening off the system, re - tying the end knot shorter and tensioning again until the end knot is against the belay the rope will become almost atatic and

retighting will only be needed occasionally.

The last man across going into the cave must make sure the tyrolean is sufficiently tight for the return. On the way out the rope should be slackened off a little to prevent unnecessary periods of highly tensioned rope. Never clip into the 2 - 1 itself as loading of one part only will siacken the whole system.

V. Types of Tyroleans

1. Low tyroleans

These are the most dangerous as they are on or near the water. If they can't be avoided they should be rigged with two parallel ropes about 0.5m apart and equally tensioned. No attachment should be amde to these ropes and they should be crossed on ones's belly - commando style.

High Tyrolens (over 1.5m) : These give the most comfortable crossings and should be sought. Attachment is made to the system with a pulley or steel krab direct to the body harness.

2. Other Methods

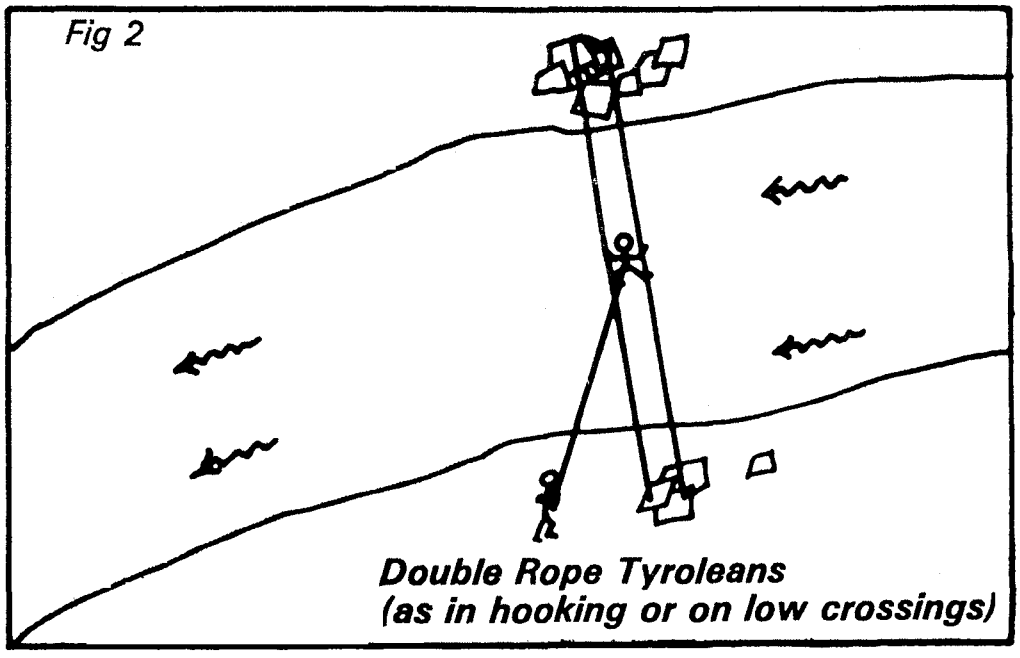
Artificial climbing is a possibility if conditions allow it. A ceiling progression may permit a pendulum.

"Hooking"(Fig 2) uses the initial fixed line as the tyrolean. The safest way is to throw a double rope around a large boulder or stal, tension both ends and cross commando - style on the two ropes.

Lifelined boulder hopping can be used if a suitable staring of boulders crosses the river.

The surf sledge is a new technique developed by the French Antipodes Expedition and used successfully in Minye River Cave. It is a

specifically designed small surfboard (1m × 0.5m approx.) with a turned up bow. A non - stretch Kevlar rope is fixed diagonally downstream across the river. The bow of the sledge is attached to the rope and the crosser "rides the waves" while the current forces him to the far side. There are two handle grips on either side of the board to hold onto and keep stability. A lifeline is used.



3. Attire

For these first crossings as little as possible should be worn. All dangling straps, buckles and ropes which could snag in the river must be discarded. Tackle bags can be hauled across later. Essential items are one or two bouyancy aids, harness, helmet and waterproof light(Techa lamps are ideal).

VI. Tyroleans

Once a man is across the river a tyrolean can soon be safely rigged.

1. Belays

The foeces on the belays of tyroleans are great, in theory they can be infinite. We used Y - or tri - anchor belays on all bolt, piton or chock combinations. Natural belays must also be treated with suspicion : the most solid looking stal boss may be formed on a thin layer of mud or have other hidden weakness (New Britain is in an earthquake zone). The slight sawing action of the rope around a natural belay whilst the tyrolean is in use can cause serious abrasion and rope protectors should be used.

2. Tightening

Even a 'static' SRT rope has too much stretch in it for a safe crossing. A small amount of slack in a tyrolean can cause serious mid - rope problems, especially on low srossings. (I undersyand a slack tyrolean caused the death of a Swiss caver in the Kavakuns River Cave).

The most successful way of tightening tyroleans is undoubtedly the 2 - 1 method(Fig 3). It requires three krabs to be jammer is used to it as it prevents the lifeliner from pulling back the person experiencing difficulties.

Tiited Tyroleans(15 ° +) : These should be rigged with one tight rope and a parallel slack one(Fig 4). For the upward crossing, clip the two ropes together with a krab and prussik up the slack rope behind it. Clip into the tensioned rope with a crowstail for safety.

For the downward crossing use a krab or pulley as normal. If the descent is very steep put a descender on the slack rope to act as a brake.

VII. Lifelining

By its very nature lifelining in river caves is to be taken very seriously. First crossings will fail and the ;ifeliner must be alert and ready to react quickly. As a general principle the current should be used to advantage and not fought against.

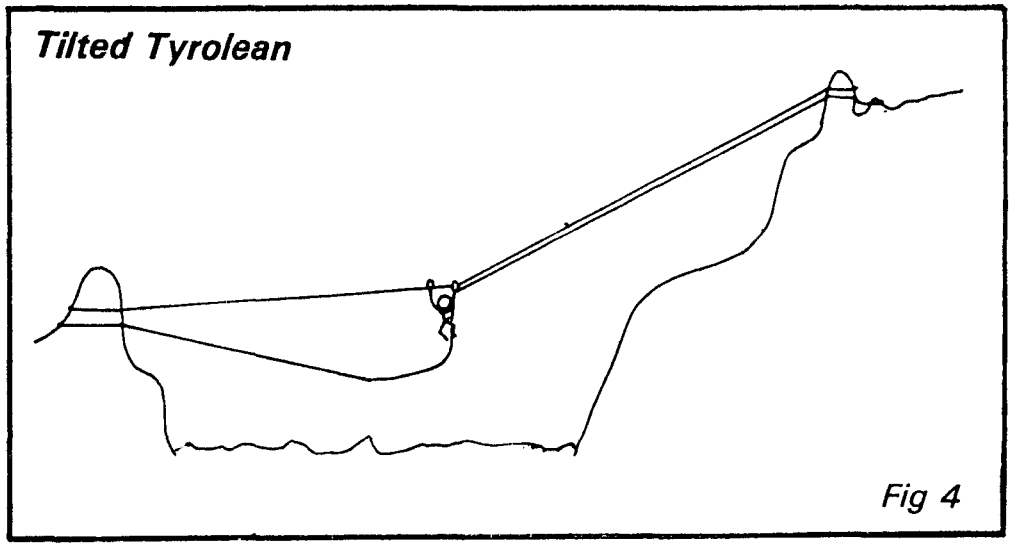


Fig 4

1. From upstream

This is very dangerous and is not recommended. The moment the crosser falls into the water he becomes inert and the wave produced will submerge him.

2. From downstream

This id by far the better method. The lifeliner must be stationed downstream from the crossing point and a suitable recovery zone allowed for. The distance between the lifeliner and the end of the recovery zone must not be less than the width of the river. If the crossing fails you let yourself be carried away by the current. The bouyancy aid will, by

swimming and with the aid of the current, be brought into the bank.

The lifeliner must, of course, be belayed and the lifeline should be locked off with an Italian Hitch at a length eaual to the distance from the stance to the end of the recovery zone. This will prevent the swimmer being swept into a danger area if the lifeliner is unable to hold the man.

3. From above

Where the bank is steep or vertical, lifelining can be done from above. The principle is the same as for downstream lining but traction pulls the man out of the water. The height between the stance and the water must be greater than the width of the river.

Wherever one lifeline from it is worth gaining what height is available. This helps the rope clear any rocks and gives the lifeliner a good all round view.

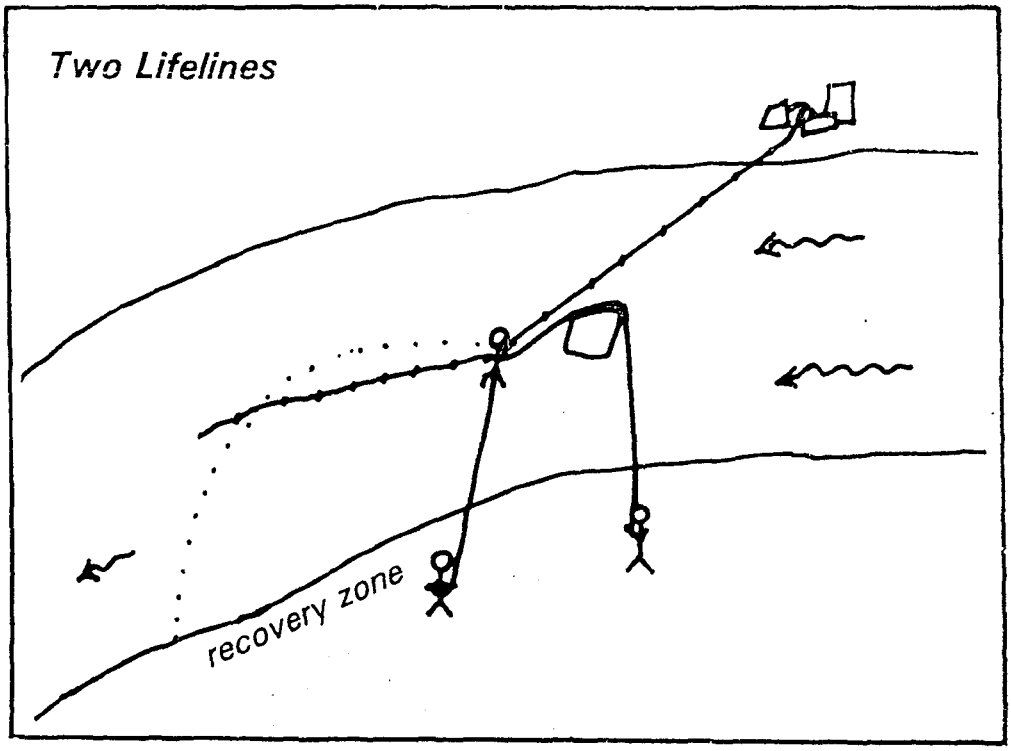
4. Two lifelines

When a crossing is attempted upstream of boulders protruding in mid - river, thought should be given to the possibility of the lifeline snagging on the rocks and preventing the swimmer gaining the bank. Another line can be positioned further downstream from the first(Fig 5) and if necessary the two used to manouver the swimmer into the bank.

5. Lining on established crossings

Once a tyrolean is properly rigged lifelining can be done from a different stance in some cases. On low tyroleans it will always have to be carried out from downstream or above. On tilted tyrolens, with two ropes backed up to independent belays, no lifeline is required as long as

attachment is made to both ropes. On high tyroleans out of the water, where attachment is made to the rope, the crosser will only have to be pulled back along the rope should be experience trouble e.g. rope too slack. The stance can thus be moved to near the tyrolean belays. It is imperative that no attachment is made to the prussik device.



All photographs from colour transparencies by members of the Untamed River Expedition.

VIII. Fixing Traverse lines

Travers lines high above the river offer no different problems to those in ordinary caving, but those near to water level are more serious. A belay failure can throw the caver into the current where he will be held on the lifeline unable to be pulled out against the gorce of the water. To gain the extra strength nedded on the line, a 2 - 1 pulley system can be

employed as a lifeline which will enable the caver to be hauled out up to the last runner. The only alternative is to pay out slack until the victim can gain some banking.

IX. Conclusions

Expeditions to Mexico, Peru and Indonesia have already come up against big underground rivers ; New Guinea has plenty more to offer and China certainly has some. Perhaps more importantly the future trend in caving is for more groups to venture further afield. With more grant aid and better recognition, sponsorship will be more forthcoming and there is no reason why New Guinea alone shouldn't see three or four expeditionss a year in the 1990's.

The methods used proved successful but the risks are still high and L'm sure many improvements could be made. With our knowledge as it is I consider the risks involved in tracking these caves on a similar level to those associated with cave diving. We got our fingers burnt only once and were lucky. It was once too many. Be careful.